

PROJECT MANUAL

VIRGIN ISLAND NATIONAL GUARD REMOVE AND REPLACE SOUTHERN PERIMETER FENCE

6304 Estate Nazareth
ST. THOMAS, UNITED STATES VIRGIN ISLANDS



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DIVISION 0 – PROCUREMENT AND CONTRACTING REQUIREMENTS

GOVERNMENT OF THE VIRGIN ISLANDS, VIRGIN ISLAND NATIONAL GUARD

REPLACE SOUTHERN PERIMETER FENCE

6304 ESTATE NAZARETH, ST.THOMAS, UNITED STATES VIRGIN ISLANDS

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DIVISION 1 – GENERAL REQUIREMENTS

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SECTION 01000 - SUMMARY

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PART 1 GENERAL

1.1 PROJECT

A. Project Name:

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B. Owner's Name:

VIRGIN ISLANDS GOVERNMENT. NATIONAL GUARD

C. Plan Designer's Name:

DEPARTMENT OF PUBLIC WORKS

D. The complete Project consists of furnishing all materials, tools, supplies, equipment, labor and professional supervision required to replace the chain link fence along the southern perimeter of the Estate Nazareth Military Compound

E. Owner will remove the following items before start of work:

1. N/A

1.2 SALVAGE BY CONTRACTOR

A. Contractor shall remove and store the following, for later reinstallation by Contractor, prior to start of work:

1. N. A.

1.3 WORK BY OTHERS

A. N.A.

1.4 OWNER FURNISHED PRODUCTS

A. Products furnished by Owner include the following categories:

1. OFCI:

Owner furnished Contractor installed.

2. OFCR:

Owner furnished Contractor rough-in:

3. OFOI:

Owner furnished Owner Installed.

B. Owner Responsibilities for products in the following category:

OFCI

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1. Arrange installation inspections required by regulatory agencies having jurisdiction.

C. Contractor's Responsibilities (for all categories unless otherwise noted): OFCR;

1. Coordinate installation of Owner furnished products with other portions of the Work.

2. Designate submittal and delivery date for each product affecting construction schedule.

3. Review submittals of Owner furnished products and verify rough-in requirements prior to installation for products in the following categories:

a. OFCI

b. OFCR

Notify Owner's Representative of discrepancies that would affect installation and rough-ins.

4. Promptly inspect products jointly with the Owner, record shortages, damaged or defective products listed in the following categories:

c. OFCI

5. Protect products from damage after installation.

d. The sink and the cabinetry in the Break Room are to remain.

6. Assemble, install connect, adjust, test and calibrate, and finish products listed in the following category:

e. OFCI.

7. Provide mechanical, plumbing and electrical connections to Contractor installed products including installation of service fixtures for products listed in the following categories:

f. OFCR

g. OFCI.

8. Afford Owner's forces a reasonable opportunity for delivery and storage of their products and the execution of their work. Where required, Construction Manager shall properly connect his work to that installed by the Owner's forces.

9. Repair or replace items damaged by Construction Manager.

10. Receive and unload products at the site for products listed in the following categories:

h. OFCI

i. OFCR.

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11. Handle products at the site, including uncrating and storage for products listed in the following categories:

j. OFCI

k. OFCR.

1.5 CONTRACTOR FURNISHED PRODUCTS

A. Products furnished by Contractor consist of products listed in the following category:

1. Fencing: at a minimum the new fencing must be an equivalent to ImPASSE II – High Security Steel Fencing System manufactured by Ameristar to Construction Specification Sect 32 31 19. Minimum height of fence to be seven feet (7') above the top of the installed curb.

2. Guardrail System and Terminal Ends

B. Contractor's responsibilities:

1. As indicated in the Construction Documents.

1.6 OWNER OCCUPANCY

A. Owner intends to occupy the Military Compound.

B. Cooperate with Adjacent Property Owners to minimize conflict and to facilitate the adjacent Landowner's operations with the least amount of inconvenience.

C. Contractor shall take precautions to avoid excessive noise or vibration that would disturb Adjacent Property owners' operations. When directed by Owner, Contractor shall perform certain operations at designated time of day or night in order to minimize disturbance to Owner's operations.

D. Schedule the Work to accommodate Owner occupancy.

1.7 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations are limited to areas permitted by Law, Ordinances, Permits and Contract Documents.

B. Arrange use of site and premises to allow:

1. Owner occupancy and operation.

2. Use of adjacent sites by the public.

C. Do not unreasonably encumber site or premises with materials or equipment.

D. Limit use of site and premises for Work and storage as follows:

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1. Maintain Owner and public access to existing building, parking, drives and walks at all times.
 2. Restrict work and storage to construction areas indicated on Drawings.
 3. Existing parking areas may not be used for storage.
 4. Access site only as indicated on the Drawings.
 5. Restrict parking to areas designated by the Owner.
 6. Do not perform operations that would disrupt or delay Owner's daily operations.
 7. Restrict construction personnel from access to other areas of the site and existing building, except as required to perform new and alterations work.
- E. Assume full responsibility for protection and safekeeping of products stored on premises.
- F. Relocate stored products which interfere with operations of Owner.
- G. Do not load structure with weight that will endanger structure.
- H. Emergency Building/Site Exits during Construction:
1. Keep all existing site exits open during construction period.
 2. Provide barricade and signage in accordance with all requirements of the local building authorities during construction.
- I. Utility Outages and Shutdown:
- To be scheduled with the Owner's representative prior to implementing.

1.8 WORK SEQUENCE

- A. Contractor shall be required to perform the work between the hours of 8:00 AM to 5:00PM Monday to Friday except for Federal Holidays. Arrangements to work at different times or days must be coordinated through the Construction and Facilities Management Officer in order to gain access to the facility.
- B. Work Schedule: Provide starting date, completion date, days to be worked and hours to be worked.
- C. Any request for variance from this specification shall be in writing and submitted to the Construction and Facilities Management Officer at least five (5) working days in advance. Approval shall be at the Command Officer.
- D. The Contractor shall confine operations at the job-site to areas permitted by the Construction and Facilities Management Officer or their representative. Contractor shall not unreasonably encumber the job site with materials or equipment and shall assume full responsibility for the protection and safekeeping of products stored on the premises.

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- E. All work shall comply with standards as expressed Federal and Territorial Building Codes.
- F. At the job completion, the contractor shall clean up the work area and remove all trash and debris from the job site and return site to original or better condition.

1.9 SECURITY

- A. The Contractor and their employees shall be subject to and shall at all times conform with any and all rules, regulations, policies and procedures pertaining to the security at the above listed facilities. Any violations or disregard for the rules, regulations and policies may be cause for immediate termination of the Contractor.
- B. The Contractor and their employees shall at all times produce and display picture identification identifying the individual as an employee of the vendor.
- C. The contractor shall comply with all security regulations imposed by the base/post commander and/or agency occupying the space where work is to be performed. Any necessary security clearances shall be obtained prior to commencement of work.
- D. It is expected that new security requirements to satisfy contractor personal identification requirements in Homeland Security Presidential Directive (HSPD-12), "Policy for a Common Identification Standard for Federal Employees and Contractors", and Federal Information Processing Standards Publication (FIPS PUB) Number 201, "Personal Identity Verification (PIV) of Federal Employees and Contractors" will be enacted during the life of this contract. Contractor shall comply will all requirements, at no additional cost to the Government.
- E. The contractor shall ensure that all parts of the facility where work is being performed are adequately protected against vandalism and theft.
- F. Contractors shall follow instructions provided by the Security Forces for access of the Estate Nazareth Compound in Nazareth, VI 00802. If a gate pass is not granted to a contractor allowing the delivery of goods, execution of warranty support, or performance of services please contact the contracting officer representative. Be sure that all of your employees have the proper ID (driver's license, state ID, immigration card, U.S. Passport, etc.). If they do not have the proper ID, they will be turned away.
- G. The Prime Contractor and all of its subcontractor will be required to wear orange or lime colored safety vest while performing work on the installation.
- H. U.S. Government will not be held liable for any delays or breach of contract caused by refusal of the Security Forces to allow entry.
- I. All prospective contractors MUST be U.S. citizens or MUST have established or maintained legal residence in the U.S., and are authorized by the US government to work in the United States (i.e. Green Card, worker authorization, etc.). All prospective contractors MUST have at least one form of U.S. government issued photo identification (driver's license, U.S. passport, U.S. work visa, etc.) for entry to the installation. Security Forces will review any questionable identification documents for determination as whether or not said identification is authorized for access to the installation.

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J. All prospective contractors/contractor employees, once it has been established that they maintain the appropriate credential as described in one above, are subject to a Criminal History Check.

K. Note: For the purposes of contracting services, it is implied that, that any and all parties agree to a Criminal History Background Check once entered into any contract. Any documents that are provided and found fraudulent to include, but not limited to driver's licenses, contracting licenses, etc., will result in an arrest and potential termination for default from the contract. All contractors are subject to search in order to obtain entry onto the installation and while working on the installation. Any refusal to submit to a search of their person or vehicle will be deemed as a violent act of aggression against the installation and will be cause for dismissal from the installation and revocation of future privileges and installation access.

1.10 ENVIROMENTAL

A. The Virgin Islands National Guard (VING) has instituted an environmental Management System Policy (eMS). Its aim is to implement and communicate long-term goals for environmental protection, improvement and stewardship. This could be achieved through continuous monitoring, assessing, reviewing and approving our environmental objectives and target.

B. All personnel; military, civilian workers, contractors and visitors doing business with VING must conform to the eMS protocols in and around VING facilities and training area. Embodied in the Adjutant General's eMS Policy is the requirement to adhere and comply with all environmental laws, rules, regulations and practices encoded in Federal, Territorial, Department of Defense and VING's laws, rule, regulations and practices.

1.11 BID SCHEDULE

A. The Contract Scope is a Unit Price offer to include the entire Scope Of Work described in the Contract Documents. The Contractor shall complete the Bid Schedule included in the Contract Documents and submit it with their bid. The Bid Schedule is representative of a breakdown of major scope items. Items shown in the Contract Documents, but not specifically shown in the Bid Schedule are also included in the Contract Cost.

PART 2 PRODUCTS- NOT USED

PART 3 EXECUTION- NOT USED

END OF SECTION

SECTION 01020 - ALLOWANCES

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PART 1 - GENERAL

1.1 - GENERAL CONDITIONS

A. This item covers general project requirements for documentation, meetings, material certifications, certified payrolls, safety tape, marking paint, chalk, barricades, OSHAA compliance, management of crews and subcontractors, insurance, project photos, as-built drawings, temporary power, shop drawings, organizing operations to allow adjacent usage by the public, maintaining drives and walks for access to the site, compliance with laws and ordinances, securing and paying for necessary permits, and supplying miscellaneous materials required for construction.

B. This item includes construction survey layout.

1.2 MOBILIZATION

A. This item covers preparation of secure areas to accept storage of materials and equipment, mobilization of crews and construction materials, and transportation of equipment and scaffolding.

A. Demobilization and cleanup of the staging areas.

PART 2 - PRODUCTS- NOT USED

PART 3 - PAY ITEMS

A. The General Conditions pay item will be limited to ten percent (10%) of the contract value.

B. The Mobilization pay item will be limited to ten percent (10%) of the contract value.

1. Fifty percent (50%) will be paid upon contract execution.
2. Twenty-five percent (25%) will be paid upon construction start.
3. Twenty-five percent (25%) will be paid upon demobilization and site cleanup.

END OF SECTION

SECTION 01039-COORDINATION AND MEETINGS

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PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Coordination and project conditions.
- B. Field engineering.
- C. Preconstruction meeting.
- D. Site mobilization meeting.
- E. Progress meeting.
- F. Pre-installation meetings.
- G. Equipment electrical characteristics and components.
- H. Examination.
- I. Preparation.
- J. Cutting and Patching.
- K. Alteration project procedures.

1.2 RELATED SECTIONS (NOT USED)

1.3 COORDINATION AND PROJECT CONDITIONS

- A. Coordinate scheduling, submittals, and Work of the various sections of the Specifications to ensure an efficient and orderly sequence of construction elements.

1.4 VERIFY ALL EXISTING UTILITY LOCATIONS.

1.5 FIELD ENGINEERING

- A. Contractor shall locate and protect all survey control and reference points, and shall accurately replace and have verified by the Engineer any such point, which is damaged or moved, at his own expense.
- B. Control datum for survey is as that shown on Drawings. The survey shall establish certain reference points and benchmarks in the immediate vicinity of the work areas. The Contractor shall lay out all additional lines and grades and otherwise do all layout and measurements necessary for the proper completion of the work.
- C. Verify setbacks and easements; confirm drawings dimensions and elevations.
- D. Provide field engineering services. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.

SECTION 01039-COORDINATION AND MEETINGS

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- E. The Contractor shall furnish assistance to the Engineer as requested to check the layout or otherwise control the work. Such assistance shall be understood to include the provision of suitable manpower to assist the Engineer in taping measurements, holding a survey rod for checking grades and the like.
- F. The Engineer reserves the right to inspect or check any of this work, and the Contractor shall not claim added compensation for any delay occasioned by required as a result of the Engineer's inspections.

1.6 PRECONSTRUCTION MEETING

- A. Owner will schedule a meeting after Notice of Award.
- B. Attendance Required:
Owner, Owner's Construction Representative, Designer, and Contractor.
- C. Agenda:
 - 1. Submission of list of testing agency and other parties providing services on the project.
 - 2. Procedures and processing of field decisions, submittals, and substitutions, applications for payments, pricing request, Change Orders, and Contract closeout procedures.
 - 3. Procedures for layout of the project, establishing controls, limits of right-of-way and easements.
 - 4. Scheduling.
 - 5. Owner's Representative shall record minutes and distribute copies to participants and those affected by decisions made.

1.7 SITE MOBILIZATION MEETING

- A. Owner's Representative may schedule a meeting at the project site prior to construction start-up.
- B. Attendance Required:
Owner's Representative/Engineer, Contractor's Superintendent, and major Subcontractors.
- C. Agenda:
 - 1. Use of the site by Owner and Contractor.
 - 2. Owner's requirements. Features to remain.
 - 3. Construction facilities provided by Contractor.
 - 4. Temporary utilities provided by Contractor.
 - 5. Security and housekeeping procedures.

SECTION 01039-COORDINATION AND MEETINGS

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6. Schedules.
7. Application for payment procedures.
8. Procedures for testing.
9. Procedures for maintaining record documents.
10. Contractor will record minutes and distribute copies to participants and those affected by decisions made.

1.8 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout the progress of the Work at weekly intervals or intervals agreed to by Owner's Representative and Contractor.
- B. Contractor shall arrange weekly meetings, prepare agenda with copies for participants, and preside at meetings.
- C. Attendance Required:
Job superintendent, major Subcontractors suppliers, and Owner's Representative as appropriate to agenda topics for each meeting.
- D. Agenda:
 1. Review minutes of previous meetings.
 2. Review of Work progress.
 3. Field observations, problems, and decisions.
 4. Identification of problems which impede planned progress.
 5. Review of submittals schedule and status of submittals.
 6. Review of off-site fabrication and delivery schedules.
 7. Maintenance of progress schedule.
 8. Corrective measures to regain projected schedule.
 9. Planned progress during succeeding work period.
 10. Coordination of projected progress.
 11. Maintenance of quality and work standards.
 12. Effect of proposed changes on progress schedule and coordination.
 13. Other business relating to Work.

SECTION 01039-COORDINATION AND MEETINGS

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14. Contractor will record minutes and distribute copies to participants and those affected by decisions made.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01045-CUTTING AND PATCHING

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division- 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for cutting and patching.

1.3 SUBMITTALS

A. Cutting and Patching Proposal:

Where approval of procedures for cutting and patching is required before proceeding, submit a proposal describing procedures well in advance of the time cutting and patching will be performed and request approval to proceed. Include the following information, as applicable, in the proposal:

1. Describe the extent of cutting and patching required and how it is to be performed indicate why it cannot be avoided.
2. List products to be used and firms or entities that will perform Work.
3. Indicate dates when cutting and patching is to be performed.
4. List utilities that will be disturbed or affected, including those that will be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.
5. Approval by the Owner/Owner's Representative to proceed with cutting and patching does not waive the Owner/Owner's Representative's right to later require complete removal and replacement of a part of the Work found to be unsatisfactory.

1.4 QUALITY ASSURANCE

A. Operational and Safety Limitations:

Do not cut and patch operating elements or safety related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance, or decreased operational life or safety.

1. Obtain approval of the cutting and patching pricing proposal before cutting and patching the following operating elements or safety related systems:
 - a. Electrical wiring systems.
 - b. Pavements

1.5 VISUAL REQUIREMENTS:

SECTION 01045-CUTTING AND PATCHING

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- A. Remove and replace Work cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Use materials that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that fully match existing adjacent surfaces possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Before cutting existing surfaces, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.
1. Before proceeding, meet at the site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

3.2 PREPARATION

- A. Protection:
- Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.
- B. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- C. Take all precautions necessary to avoid cutting existing pipe, conduit or ductwork until provisions have been made to bypass them.

3.3 PERFORMANCE

- A. General:
- Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.
1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.
- B. Cutting:
- Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible review proposed procedures with the original installer; comply with the original installer's recommendations.

SECTION 01045-CUTTING AND PATCHING

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1. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
3. Comply with requirements of applicable Sections of Division-2 where cutting and patching requires excavating and backfilling.
4. By-pass utility services such as pipe or conduit, before cutting, where services are shown or required to be removed, relocated or abandoned. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.

C. Patching:

Patch with durable seams that are as invisible as possible. Comply with specified tolerances.

1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

3.4 CLEANING

- A. Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

END OF SECTION

SECTION 01095 – REFERENCE STANDARDS AND DEFINITIONS
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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division I Specification Sections, apply to this Section.

1.2 DEFINITIONS

A. General:

Basic Contract definitions are included in the Conditions of the Contract.

B. Indicated:

The term indicated refers to graphic representations, notes, or schedules on Drawings, or other Paragraphs of Schedules in the Specifications, and similar requirements in the Contract Documents. Terms such as shown, noted, scheduled, and specified are used to help the reader locate the reference. There is no limitation on location.

C. Directed:

Terms such as directed, requested, authorized, selected, approved, required and permitted mean directed by the Owner's Representative, requested by the Owner's Representative, and similar phrases.

D. Approved:

The term approved, when used in conjunction with the Owner's Representative's action on the Contractor's submittals, applications, and requests, is limited to the Owner's Representative's duties and responsibilities as stated in the Conditions of the Contract.

E. Regulations:

The term regulations includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

F. Furnish:

The term furnish means supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. Install:

The term describes operations at the Project site including the actual unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, and finishing, curing, protecting, cleaning, and similar operations.

H. Provide:

The term provide means to furnish and install, complete and ready for the intended use.

I. Installer:

SECTION 01095 – REFERENCE STANDARDS AND DEFINITIONS

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An installer is the Contractor or another entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier, to perform a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

J. Trades:

Using terms such as carpentry is not intended to imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as carpenter. It also does not imply that requirements specified apply exclusively to tradespersons of the corresponding generic name.

K. Project site:

The space available to the Contractor for performing construction activities either exclusively or in conjunction with others performing other work as part of the Project. The extent of the Project site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.

L. Testing Agencies:

A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project site or elsewhere, or to reports on and, if required, to interpret results of those inspections or tests.

M. Owner's Representative:

Agent authorized to act on behalf of the Owner.

1.3 SPECIFICATION FORMAT AND CONTENT EXPLANATION

A. Specification Format:

These Specifications are organized into Divisions and Sections based on the Construction Specification Institute's 50 - Division Format and MASTER FORMAT numbering system.

B. Specification Content:

This Specification uses certain conventions regarding the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:

1. Abbreviated Language:

Language used in Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words that are implied, but not stated, shall be interpolated as the sense requires. Singular words will be interpreted as plural and plural words interpreted as singular where applicable as the context of the Contract Documents indicate.

2. Imperative and streamlined language is used generally in the Specifications. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the Text, subject language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor, or by other means when so noted.

SECTION 01095 – REFERENCE STANDARDS AND DEFINITIONS

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- a. The words "shall be" are implied wherever a colon (:) is used within a sentence or phrase.

1.4 INDUSTRY STANDARDS

A. Applicability of Standards:

Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates:

Comply with the standards in effect as of the date of the Contract Documents.

C. Conflicting Requirements:

Where compliance with two or more standard is specified and where the standards may establish different or conflicting requirements for minimum quantities or quality levels, refer requirements that are different but apparently equal and other uncertainties to the Owner's Representative for a decision before proceeding.

D. Minimum Quantity or Quality Levels:

The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to the Owner's Representative for a decision before proceeding.

E. Copies of Standards:

Each entity engaged in construction on the project is required to be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, the Contractor shall obtain copies directly from the publication source.

F. Abbreviations and Names:

Trade association names and titles of general standards are frequently abbreviated. Where such acronyms or abbreviations are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards-generating organization, authority having jurisdiction, or other entity applicable to the context of the Text provision. Refer to the "Encyclopedia of Associations," published by Gale Research Co., available in most libraries.

1.5 SUBMITTALS

A. Permits, Licenses, and Certificates:

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For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence, and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 01200 – PRICE AND PAYMENT PROCEDURES

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PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Procedures for preparation and submittal of applications for progress payments.
- B. Documentation of changes in Contract Sum and Contract Time.
- C. Change procedures.
- D. Procedures for preparation and submittal of application for final payment.

1.2 RELATED SECTIONS: N/A

1.3 SCHEDULE OF VALUES

- A. Submit a printed schedule on AIA Form G703 -Application and Certificate for Payment Continuation Sheet.
- B. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.
- C. Format:
 - Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification Section. Identify site mobilization, bonds, and insurance, and site demobilization.
- D. Revise schedule to list approved Change Orders, with each Application for Payment.

1.4 APPLICATIONS FOR PROGRESS PAYMENT

- A. Payment Period:
 - Submit at intervals stipulated in the Agreement.
- B. Present required information as typewritten/computer-generated form.
- C. Form:
 - AIA G702 Application and Certificate for Payment and AIA G703 -Continuation Sheet including continuation sheets when required.
- D. For each item, provide a column for listing each of the following:
 - 1. Item Number
 - 2. Description of Work
 - 3. Scheduled Values
 - 4. Previous Applications
 - 5. Work in Place and Stored Materials under this Application

SECTION 01200 – PRICE AND PAYMENT PROCEDURES

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6. Total Completed and Stored to Date of Application
7. Percentage of Completion
8. Balance to Finish
9. Retainage
10. Execute certification by signature of authorized officer.
11. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored Products.
12. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original time of Work.
13. Submit two copies of each Application for Payment.
14. Include the following with the application:
 15. 1. Transmittal Letter as specified for Submittals in Section 01300.
16. Construction progress schedule revised and current as specified in Section 01300.
17. Current construction photographs specified in Section 01300.
18. Partial release of liens from major Subcontractors and Vendors.
19. Affidavits attesting to off-site stored products.
20. When Owner's Representative requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of date with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

1.5 MODIFICATION PROCEDURES

- A. Owner's Representative will advise of minor changes in the Work not involving an adjustment to Contract Sum or Contract Time as authorized by the Conditions of the Contract by issuing supplemental instructions on AIA Form G710.

1.6 CONSTRUCTION CHANGE DIRECTIVE:

Owner's Representative may issue a document, signed by Owner, instructing Construction Manager to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. The document will describe changes in the Work and will designate method of determining any change in Contract Sum or Contract Time.
2. Promptly execute the change in Work.

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3. Pricing Request:

Owner's Representative may issue a document which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Construction Manager shall prepare and submit a fixed price quotation within 15 days.

B. Computation of Change in Contract Amount:

1. For change requested by Owner's Representative for work falling under a fixed price contract, the amount will be based on Construction Manager's price quotation.
2. For change requested by Construction Manager, the amount will be based on the Construction Manager's request for a Change Order as approved by Owner.
3. For pre-determined unit prices and quantities, the amount will be based on the fixed unit prices.
4. For change ordered by Owner's Representative without a quotation from the Construction Manager, the amount will be determined by Owner's Representative based on the Construction Manager's substantiation of costs as specified for Time and Material Work.

C. Substantiation of Costs:

Provide full information required for evaluation.

1. Provide the following data:
 - a. Quantities of products, labor, and equipment
 - b. Taxes, insurance, and bonds
 - c. Overhead and profit
 - d. Justification for any change in Contract Time
 - e. Credit for deletions from Contract, similarly documented
2. Support each claim for additional costs with additional information:
 - a. Origin and date of claim
 - b. Dates and times work was performed, and by whom
 - c. Time records and wage rates paid
 - d. Invoices and receipts for products, equipment, and subcontracts, similarly documented

SECTION 01200 – PRICE AND PAYMENT PROCEDURES

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3. For Time and Material Work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.

D. Execution of Change Orders:

Owner's Representatives will issue Change Orders for signatures of parties as provided in the Conditions of the Contract on AIA G701.

- E.** After execution of Change Order, promptly revise Schedules of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.

- F.** Promptly revise Progress Schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

1.7 APPLICATION FOR FINAL PAYMENT

- A.** Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

- B.** Application for Final Payment will not be considered until the following have been accomplished:

1. All closeout procedures specified in Section 01700

PART 2 - PRODUCTS-NOT USED

PART 3 - EXECUTION-NOT USED

END OF SECTION

SECTION 01300 – SUBMITTALS

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PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Project coordination
- B. Preconstruction meeting
- C. Progress meetings
- D. Progress photographs

1.2 RELATED SECTIONS

- A. Section 01700-Execution Requirements:
Additional coordination requirements.

1.3 SECTION 01780-CLOSEOUT SUBMITTALS:

- A. Project record documents.

1.4 PROJECT COORDINATION

- A. Contractor:
The Contractor shall be responsible for overall project coordination between subcontractors and trade contractors.
- B. Cooperate with the Contractor in allocation of mobilization areas of site; for field offices and storage, for personnel access, traffic, and parking facilities.
- C. During construction, coordinate use of site and facilities through the Contractor.
- D. Comply with Contractor procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts. Particular attention should be given to the Contractor's subcontractor safety policy.
- E. Comply with instructions of the Contractor for use of temporary utilities and construction facilities.
- F. Coordinate field engineering and layout work under instructions of the Contractor.
- G. The Contractor to make the following types of submittals to Owner's Representative:
 - 1. Requests for Interpretation
 - 2. Requests for Substitution
 - 3. Shop Drawings, Product Data, and Samples
 - 4. Test and Inspection Reports

SECTION 01300 – SUBMITTALS

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5. Manufacturer's Instructions and Field Reports
6. Applications for Payment and Change Order requests
7. Progress Schedules
8. Coordination of Drawings
9. Closeout Submittals

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 PRECONSTRUCTION MEETING

- A. Contractor will schedule a meeting after Notice of Award and prior to mobilization.

3.2 ATTENDANCE REQUIRED:

- A. Owner:
Owner's Representative and invited Consultants
- B. Contractor:
Project Manager and Job Superintendent
- C. Major Sub-contractors as requested by the Owner and Contractor.

3.3 MINIMUM AGENDA:

- A. Execution of Owner-Contractor Agreement.
- B. Submission of executed bonds and insurance certificates.
- C. Submission of progress schedule.
- D. Procedures and processing of field decisions, submittals and substitutions, applications for payments, pricing requests, Change Orders, and Contract closeout procedures.
- E. Use of premises by Owner and Contractor.
- F. Construction facilities and controls provided by Owner.
- G. Temporary utilities provided by Owner.
- H. Survey and construction layout.
- I. Security and housekeeping procedures.
- J. Schedules.

SECTION 01300 – SUBMITTALS

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- K. Application for payment procedures.
- L. Procedures for testing.
- M. Procedures for maintaining record documents.
- N. Scheduling.
- O. Scheduling activities of Material Testing.
- P. Contractor shall record minutes and distribute copies within five days after meeting to participants, with one copy to Owner's Representative, Owner, participants, and those affected by decisions made.

1.1 PROGRESS MEETINGS

- A. Contractor shall schedule and administer meetings throughout the progress of the Work at maximum bi-monthly intervals. A representative from each major trade contractor shall be required to attend these meetings, as requested by the Owner's Representative.
- B. The Contractor shall make arrangements for meetings, prepare agenda with copies for participants, and preside at meetings.
- C. Attendance Required:
 - 1. Contractor, Project Manager and Job Superintendent.
 - 2. Owner's Representative.
 - 3. Engineer/Architect.
 - 4. Major Sub-contractors as appropriate to agenda topics for each meeting.
- D. Minimum Agenda:
 - 1. Review minutes of previous meetings.
 - 2. Review of Work progress.
 - 3. Field observations, problems, and decisions.
 - 4. Identification of problems which impede planned progress.
 - 5. Review of submittals schedule and status of submittals.
 - 6. Maintenance of progress schedule.
 - 7. Corrective measures to regain projected schedules.
 - 8. Planned progress during succeeding work period.
 - 9. Maintenance of quality and work standards.

SECTION 01300 – SUBMITTALS

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10. Effect of proposed changes on progress schedule and coordination.
11. Other business relating to Work.
12. Contractor shall record minutes and distribute copies within five days after meeting to participants, with one copy to Owner's Representative, Owner, participants, and those affected by decisions made.

1.2 PROGRESS PHOTOGRAPHS

A. Provide photographs of site and construction throughout progress of Work produced by an experienced photographer, acceptable to Owner's Representative.

B. Take photographs on date for each application for a payment and as follows:

1. Completed demolition and Site clearing.
2. Excavations.
3. Foundations.
4. Utility Installation – depth, alignment, stub-outs
5. Final completion.

C. Views:

1. Provide non-aerial photographs from three cardinal views at each specified time, until Date of Substantial Completion.
2. Consult with Owner's Representative for instructions on views required.
3. Provide factual presentation.
4. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.

D. Each Photo: Full color, jpeg format

1. Provide 3 sets on separate USB sticks
Size: 5 MB file
2. Identify each photo on file name. Identify name of Project, contract number, phase, date and orientation of view.

E. Deliver USB sticks with Application for Payment and transmittal letter specified in this Section.

END OF SECTION

SECTION 01325 – CONSTRUCTION PROGRESS SCHEDULE

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PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Preliminary schedule.
- B. Construction progress schedule, bar chart type.

1.2 RELATED SECTIONS (NOT APPLICABLE)

1.3 SUBMITTALS

- A. Within 10 days after date established in Notice To Proceed, submit preliminary schedule defining planned operations for the first 30 days of Work, with a general outline for remainder of Work, in Microsoft Project format on a USB stick.
- B. If preliminary schedule requires revision after review, submit by email in the Microsoft Project format a revised schedule within 10 days.
- C. Within 30 days after review of preliminary schedule, submit draft of proposed complete schedule by email in the Microsoft Project format for review.
- D. Within 10 days after joint review, submit complete schedule by email in the Microsoft Project format.
- E. Submit updated paper schedule with each Application for Payment.
- F. Submit the number of opaque reproductions that the Contractor requires, plus four copies which will be retained by the Owner's Representative.
- G. Submit under transmittal letter form specified in Section 01300.

1.4 QUALITY ASSURANCE

- A. Scheduler:
Contractor's personnel specialist Consultant specializing in CPM scheduling with two years minimum experience in scheduling construction work of a complexities comparable to this Project, and having use of computer facilities capable of delivering by email a detailed graphic schedule in Microsoft Project format within 48 hours of request.

1.5 SCHEDULE FORMAT

- A. Listings:
In chronological order according to the start date for each activity. Identify each activity with the applicable Specification Section number.
- B. Hard Copy Sheet Size: Multiples of 8-1/2 x 11 inches.
- C. Scale and Spacing: To allow for notations and revisions.
- D. Software Format: Microsoft Project

SECTION 01325 – CONSTRUCTION PROGRESS SCHEDULE

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PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 PRELIMINARY SCHEDULE

- A. Prepare preliminary schedule in the form of a horizontal bar chart.

CONTENT

- A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
- B. Identify each item by Specification Section number.
- C. Identify Work of separate stages and other logically grouped activities.
- D. Provide separate schedule of submittal dates for shop drawings, product data, and dates reviewed submittals will be required from the Owner's Representative. Indicate decision dates for selection of finishes.
- E. Provide legend for symbols and abbreviations used.

BAR CHARTS

- A. Include a separate bar for each major portion of Work or operation.

REVIEW AND EVALUATION OF SCHEDULE

- A. Participate in joint review and evaluation of schedule with Owner's Representative at each submittal.
- H. Evaluate project status to determine work behind schedule and work ahead of schedule.
- I. After review, revise as necessary as result of review, and resubmit within 10 days.

3.6 UPDATING SCHEDULE

- A. Maintain schedules to record actual start and finish dates of completed activities.
- B. Indicate progress of each activity to date of revision, with projected completion date of each activity.
- C. Annotate diagrams to graphically depict current status of Work.
- D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.
- E. Indicate changes required to maintain Date of Substantial Completion.

3.7 DISTRIBUTION OF SCHEDULE

SECTION 01325 – CONSTRUCTION PROGRESS SCHEDULE

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- A. Distribute copies of updated schedules to Contractor's project site file, to Subcontractors, Suppliers, Engineer/Architect, Owner's Representative, and other concerned parties.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in schedules.

END OF SECTION

SECTION 01400 – QUALITY CONTROL

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PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Quality assurance- control of installation
- B. Tolerances
- C. References and standards
- D. Mock-up
- E. Inspecting and testing laboratory services
- F. Manufacturers' field services

1.2 RELATED SECTIONS

- A. Section 01000 General Specifications:
Contractor's Shop and Working Drawings.

1.3 QUALITY ASSURANCE - CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Owner's Representative/Engineer before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform Work by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration physical distortion, or disfigurement.

1.4 TOLERANCES

- A. Monitor fabrication and installation tolerance control of Products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances conflict with Contract Documents, request clarification from Owner's Representative/Engineer before proceeding.
- C. Adjust Products to appropriate dimensions; position before securing Products in place.

SECTION 01400 – QUALITY CONTROL

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1.5 REFERENCES AND STANDARDS

- A. For Products or workmanship specified by association, trade, or other consensus standards, complies with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current on date of Contract Documents, except where a specific date is established by code.
- C. Obtain copies of standards where required by product Specification Sections.
- D. Neither the contractual relationships, duties, nor responsibilities of the parties in Contract, nor those of the Owner's Representative/Engineer shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.6 MOCK UP (NOT USED)

1.7 INSPECTION AND TESTING LABORATORY SERVICES

- A. Owner may appoint, employ, and pay for specified services of an independent firm to perform construction testing services.
- B. The independent firm will perform testing and other services specified in individual sections and as required by the Owner.
- C. Testing reports will be submitted by the independent firm to the Owner indicating services and indicating compliance or non-compliance with the Contract Documents.
- D. Cooperate with independent firm; furnish safe access and assistance by incidental labor as requested.
 - 1. Notify Owner's Representative and/or independent firm 48 hours prior to expected time for operations requiring services. These operations include, but are not necessarily limited to:
 - a. Cast-in-place concrete placement.
 - b. Bituminous pavement construction.

1.8 INSPECTION SERVICES

- A. Owner may appoint, employ, and pay for specified services of an independent firm to perform observation.
- B. The independent firm will perform observations and other services specified in individual Specification Sections and as required by the Owner.
- C. Reports will be submitted by the independent firm to the Owner, in duplicate, indicating observations and indicating compliance or non-compliance with Contract Documents.
- D. Cooperate with independent firm; furnish safe access and assistance by incidental labor as requested.

SECTION 01400 – QUALITY CONTROL

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E. Notify Owner's Representative and /or independent firm 48 hours prior to expected time for operations requiring services.

F. Observations do not relieve Contractor to perform Work to the contract requirements.

1.9 MANUFACTURERS' FIELD SERVICES

A. When specified in individual Specification Sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, as applicable, and to initiate instructions when necessary.

B. Submit qualifications of observer to Owner 30 days in advance of required observations. Observer subject to approval of Owner.

C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new Work being applied or attached.

C. Examine and verify specific conditions described in individual Specification Sections.

D. Verify that utility services are available, of the correct characteristics, and in the correct locations.

3.2 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

END OF SECTION

SECTION 01600 – MATERIAL AND EQUIPMENT HANDLING

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PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED

- A. Products
- B. Transportation and Handling
- C. Storage and Protection
- D. Product Options
- E. Products List
- F. Substitutions

1.2 RELATED REQUIREMENTS

- A. Section 01400- Quality Control:
 Submittal of manufacturer's data
- B. Section 01700- Contract Closeout:
 Operation and maintenance data

PART 2 - PRODUCTS

2.1 GENERAL

- A. Products include the material, equipment, and systems used on this Project.
- B. Comply with the Specifications and referenced standards as minimum requirements.
- C. Components required to be supplied in quantity within a Specification Section shall be the same, and shall be interchangeable.

2.2 TRANSPORTATION AND HANDLING

- A. Transport products by methods that will avoid product damage and deliver them in undamaged condition in the manufacturer's unopened containers or packaging.
- B. Provide equipment and personnel to handle unloading and storage of the products by methods to prevent soiling or damage.
- C. Promptly inspect the shipments to assure that the products comply with requirements, the quantities are correct, and the products are undamaged.

2.3 STORAGE AND PROTECTION

- A. Store products in accordance with the manufacturer's instructions, with intact and legible seals and labels.

SECTION 01600 – MATERIAL AND EQUIPMENT HANDLING

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- B. For exterior storage of fabricated products, place on sloped supports above ground. Cover the products subject to deterioration with an impervious sheet covering; provide ventilation to avoid condensation.
- C. Store loose granular materials on solid surfaces in a well-drained area. Prevent mixing of the materials with foreign matter.
- D. Arrange storage to provide access for inspection. Periodically inspect to assure that products are undamaged, and are maintained under required conditions.

2.4 PRODUCT OPTIONS

- A. Products specified by Reference Standards or by Description Only: Furnish any product meeting those standards.
- B. Products specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not specifically named.
- C. Products specified by Naming Several Manufacturers.
- D. Products of named manufacturers meeting Specifications: No options, no substitutions will be allowed.

2.5 PRODUCTS LIST

- A. Within 15 days after the date of Owner-Contractor Agreement, submit a complete list of major proposed for use, with name of the manufacturer, trade name, and model number of each product.

2.6 SUBSTITUTIONS

- A. Only within 15 days after date of the Agreement will the Owner's Representative/Engineer consider requests from the Contractor for substitutions. Subsequently, substitutions will be considered only when a product becomes unavailable due to no fault of the Contractor.
- B. Document each request with complete data substantiating the compliance of the proposed substitution with the Contractor Documents.
- C. The request constitutes a representation that the Contractor:
 - 1. Has investigated proposed product and determined that it meets or exceeds, in all respects, the specified product.
 - 2. Will provide the same warranty for substitution as for the specified product.
 - 3. Will coordinate installation and make other changes which may be required for the Work to be complete in all respects.
 - 4. Waives claims for additional cost which may subsequently become apparent.

SECTION 01600 – MATERIAL AND EQUIPMENT HANDLING

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- D. Substitutions will not be considered when they are indicated or implied on shop drawings or product data submittals without separate written request, or when acceptance will require substantial revision of the Contract Documents.
- E. The Owner's Representative/Engineer will determine acceptability of the proposed substitution and will notify the Contractor of acceptance or rejection in writing within a reasonable time.
- F. Only one request for the substitution will be considered for each product. When substitution is not accepted, provide the specified product.

2.7 SYSTEM DEMONSTRATION

- A. Prior to the final inspection, demonstrate operation of the entire system to the Owner.

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01620 – TRANSPORTATION AND HANDLING

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PART 1 - GENERAL

- A. The Contractor shall provide transportation of all equipment, materials and products furnished under these Contract Documents to the site of the Work. In addition, the Contractor shall provide preparation for shipment and storage, unloading, handling and re-handling, short-term storage, extended storage, storage facilities, maintenance and protection during storage, preparation for installation, and all other work and incidental items necessary or convenient to the Contractor for the satisfactory prosecution and completion of the Work.

PART 2 - TRANSPORTATION

- A. All equipment shall be suitably boxed, crafted, or otherwise protected during transportation.

PART 3 - HANDLING

- A. All materials, and products shall be carefully handled to prevent damage or excessive deflections during unloading or transportation. All equipment, materials, and products damaged during transportation or handling shall be repaired or replaced by the Contractor at no additional cost to the Authority prior to being incorporated into the Work.
- B. Lifting and handling drawings and instructions furnished by the manufacturer or supplier shall be strictly followed. Spreader bars or lifting beams shall be used when the distances between lifting points exceeds that permitted by standard industry practice. Slings and chains shall be padded as required to prevent damage to protective coatings and finishes.
- C. Under no circumstances shall equipment or products such as pipe, structural steel, castings, reinforcement, lumber, piles, poles, etc., be thrown or rolled off of trucks onto the ground. Tossing of pipes and pipe fittings and accessories is an unacceptable practice. Items tossed shall be inspected by the Owner's Representative/Engineer and/or Architect. If the Owner's Representative determines that the product has been comprised, Contractor shall replace product at no additional cost to Owner.
- D. Items such as non-metallic pipe, non-metallic conduit, flagpoles, and lighting poles shall be handled using non-metallic slings or straps. Under no circumstance shall chains or steel cables be used to transport or handle non-metallic products.

END OF SECTION

SECTION 01630 – STORAGE AND PROTECTION

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PART 1 - GENERAL

- A. Equipment shall be received, inspected, unloaded, handled, stored, maintained, and protected by the Contractor in a suitable location on or off site, if necessary, until such time as installation is required.
- B. Storage and protection of Contractor-furnished equipment shall be strict conformance with the requirements of the Section entitled "General Equipment Stipulations" of these Specifications.

PART 2 - STORAGE

- A. The Contractor shall be responsible for providing satisfactory storage facilities that are acceptable to the Owner's Representative/Engineer. In the event that satisfactory facilities cannot be provided on site, satisfactory warehouse, acceptable to the Owner's Representative/Engineer, will be provided by the Contractor for such time until the materials and products can be accommodated at the site.
- B. Materials, and products that are stored in a satisfactory warehouse acceptable to the Owner's Representative/Engineer will be eligible for progress payments as though they had been delivered to the job site.
- C. The Contractor shall be responsible for the maintenance and protection of all equipment, materials, and products placed in storage and shall bear all costs of storage, preparation for transportation, transportation, re-handling, and preparation for installation.
- D. Equipment and products stored outdoors shall be supported above the ground on suitable wooden blocks or braces arranged to prevent excessive deflection or bending between supports. Items such as pipe, structural steel, and sheet construction products shall be stored with one end elevated to facilitate drainage.
- E. Unless otherwise permitted in writing by the Owner's Representative/Engineer, building products such as rough lumber, plywood, concrete block, and structural tile may be stored outdoors under a properly secured waterproof covering.
- F. Tarpaulins and other coverings shall be supported above the stored equipment or materials on wooden strips to provide ventilation under the cover and minimize condensation. Tarpaulins and covers shall be arranged to prevent ponding of water.
- G. PVC pipe, if stored outside, shall be suitably protected from sunlight (UV) by covering with a tarp or exterior paint. Such covering shall be completed and continual.

PART 3 - EXTENDED STORAGE (NOT USED)

END OF SECTION

SECTION 01700 – CONTRACT CLOSEOUT

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division - 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:
1. Inspection procedures.
 2. Project record document submittal
 3. Operating and maintenance manual submittal.
 4. Submittal of warranties.
 5. Final cleaning.
- B. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions 2 through 16, including all Mechanical, Electrical and Plumbing Specifications.

1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures:

1. Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.
 - a. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
 - b. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
 - c. Advise Owner of pending insurance change-over requirements.
 - d. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.
 - e. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities; include permits and similar releases.
 - f. Deliver tools, extra stock, and similar items.

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1.4 INSPECTION PROCEDURES:

A. On receipt of a request for inspection, the Owner will either proceed with inspection or advise the Contractor of unfilled requirements. The Owner will prepare the Certificate of Substantial Completion following inspection, or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

1. The Owner will repeat inspection when requested and assured that the Work has been substantially completed.

2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.5 FINAL ACCEPTANCE

A. Preliminary Procedures:

1. Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.

a. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.

b. Submit an updated final statement, accounting for final additional changes to the Contract Sum.

c. Submit a certified copy of the Owner's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and the list has been endorsed and dated by the Owner's Representative.

d. Submit consent of surety to final payment.

e. Submit a final liquidated damages settlement statement.

f. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

1.6 RE-INSPECTION PROCEDURE:

The Owner will re-inspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to the Owner's Representative.

Upon completion of re-inspection, the Owner's Representative will prepare a certificate of final acceptance or notify the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.

If necessary, re-inspection will be repeated.

1.7 RECORD DOCUMENT SUBMITTALS

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A. General:

Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Owner's reference during normal working hours.

1.8 RECORD DRAWINGS:

A. Maintain a clean, undamaged set of blue or black line white prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately; where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give attention to concealed elements that would be difficult to measure and record at a later date.

B. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.

C. Mark new information that is important to the Owner, but was not shown on Contract Drawings or Shop Drawings.

1. Note related Change Order numbers where applicable.

2. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.

1.9 RECORD SPECIFICATIONS:

A. Maintain one complete copy of the Project Manual, including addenda, and one copy of other written construction documents such as Change Orders and modifications issued in printed form during construction. Mark these documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications. Give particular attention to substitutions, selection of options and similar information on elements that are concealed or cannot otherwise be readily discerned later by direct observation. Note related record drawing information and Product Data.

B. Upon completion of the Work, submit record Specifications to the Owner's Representative for the Owner's records.

1.10 RECORD PRODUCT DATA:

A. Maintain one copy of each Product Data submittal. Mark these documents to show significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the site, and from the manufacturer's installation instructions and recommendations. Give attention to concealed products and portions of the Work which cannot otherwise be readily discerned later by direct observation. Note related Change Orders and mark-up of record drawings and Specifications.

1. Upon completion of mark-up, submit complete set of record Product Data to the Owner's Representative for the Owner's records.

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1.11 RECORD SAMPLE SUBMITTED:

- A. Immediately prior to the date or dates of Substantial Completion, the Contractor will meet at the site with the Owner's Representative and the Owner's personnel to determine which of the submitted Samples that have been maintained during progress of the Work are to be transmitted to the Owner for record purposes. Comply with delivery to the Owner's Sample storage area.

1.12 MISCELLANEOUS RECORD SUBMITTALS:

- A. Refer to other Specification Sections for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the Work. Immediately prior to the date or dates of Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to the Owner's Representative for the Owner's records.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 CLOSEOUT PROCEDURES

- A. Operating and Maintenance Instructions: Arrange for each installer of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance. If installers are not experienced in procedures, provide instruction by manufacturer's representatives. Include a detailed review of the following items:

1. Record documents
2. Spare parts and materials
3. Tools
4. Cleaning
5. Warranties and bonds

3.2 FINAL CLEANING

- A. General:

General cleaning during construction is required by the General Conditions and included in Section "Temporary Facilities".

3.3 CLEANING:

- A. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.
- B. Complete the following cleaning operations before requesting inspection for Final Acceptance.

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1. Remove labels that are not permanent labels.
2. Clean exposed exterior hard-surfaced finishes to a dust-free condition, free of stains, film and similar foreign substances.
3. Clean the site, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.

3.4 REMOVAL OF PROTECTION:

Remove temporary protection and facilities installed for protection of the Work during construction.

3.5 COMPLIANCE:

- A. Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner.
- B. Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

END OF SECTION

SECTION 01710 – CLEANUP

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PART 1 -GENERAL

- A. During its progress, the Work and the adjacent areas affected thereby shall be kept cleaned up and all rubbish, surplus materials, and unneeded construction equipment shall be removed and all damage repaired so that the public and property owners will be inconvenienced as little as possible.
- B. Where material or debris has washed or flowed into or been placed in existing watercourses, ditches, gutters, drains, pipe structures, as a result of Work done under this contract, or elsewhere during the course of the Contractor's operations, such material or debris shall be entirely removed and satisfactorily disposed of during the progress of the Work, and the ditches, channels, drains, pipes, structures, and work, etc., shall upon completion of the Work, be left in a clean and neat condition.
- C. On or before the completion of the Work, the Contractor shall, unless otherwise especially directed or permitted in writing, tear down and remove all temporary buildings and structures built by him; shall remove all temporary works, tools, and machinery or other construction equipment furnished by him; shall remove, acceptably disinfect, and cover all organic matter and material containing organic matter in, under, and around privies, houses, and other buildings used by him; shall remove all rubbish from any grounds which he has occupied; and shall leave the roads and all parts of the premises and adjacent property affected by his operations in a neat and satisfactory condition.
- D. Upon completion of the Work, the Contractor shall remove from the sites of the subsurface explorations all of his plant, machinery, tools, equipment, temporary work, and surplus materials; shall, unless otherwise directed or permitted in writing, remove all rubbish from any grounds which he has occupied; and shall leave the roads and all parts of the premises and adjacent property affected by his operations in a neat and satisfactory condition.
- E. The Contractor shall thoroughly clean all materials installed by him and his subcontractors, and on completion of the Work shall deliver it undamaged and in fresh and new-appearing condition.
- F. The Contractor shall restore or replace, when and as directed, any public or private property damaged by his Work, equipment, or employees, to a condition at least equal to that existing immediately prior to the beginning of operations. To this end, the Contractor shall do as required all necessary highway or driveway, walk, and landscaping work. Suitable materials, equipment, and methods shall be used for such restoration. The restoration of existing property or structures shall be done as promptly as practicable as work progresses and shall not be left until the end of the contract period.
- G. The Contractor shall submit a Waste Plan and secure a Waste permit from the VI Waste Management Authority

END OF SECTION

SECTION 01730 – GUARANTEES AND WARRANTIES

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PART 1 - GENERAL

- A. The Contractor shall warrant all materials, products, and workmanship provided by the Contractor under the Contract for a period of twelve (12) months after the date of final acceptance of the Work by the Owner.
- B. If, during the warranty period: (a) Any materials or products furnished and/or installed by the Contractor are found to be defective in service by reason on the Contractor's faulty process, structural and/or mechanical design or Specifications; or (b) Any materials, or products furnished by the Contractor shall, as soon as possible after receipt of such defective materials or products, or replace such defective materials or products.

PART 2 - START-UP OF OPERABLE COMPONENTS

- A. Because of the need to maintain operation during construction, it will be necessary to accept operable components of the project at various times prior to the completion and final acceptance of the entire project.
- B. A component of the project, as used herein, shall include all associated structures, paving, piping, etc.
- C. When a component of the project has been completed, checked out, and made ready for operation, the Contractor shall notify the Owner's Representative/Engineer in writing that the component is substantially complete and request an inspection for substantial completion. The Owner will schedule the inspection within ten (10) days of the Contractor's request. If he concurs in the Contractor's statement, the Owner's Representative/Engineer will notify the Contractor in writing that the component is accepted as substantially complete. At the same time, the Owner's Representative/Engineer will submit to the Contractor a list of items that must be completed or corrected before final acceptance can be given.
- D. If a component of the project is needed in order to maintain operation during construction and if it has been accepted as substantially complete, the Contractor shall start up the component when directed by the Owner. Once the component has achieved stable and satisfactory operation (minimum 95 percent availability over a 7- day period), the Contractor shall request beneficial occupancy by the Owner. The Department, if they concur in the Contractor's statement, that stable and satisfactory operation has been achieved, will notify the Contractor in writing within ten (10) days that he is assuming beneficial occupancy of the component.
- E. On the date that the Department assumes beneficial occupancy, the following shall occur:
 - 1. The one-year warranties for the component specified in Part 1-A of this section will begin
 - 2. The Owner will assume responsibility for operating and maintaining the component

END OF SECTION

SECTION 01780 – CLOSE OUT SUBMITTALS

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES:

- A. Project Record Document submittal.
- B. Operation and Maintenance manuals.
- C. Warranties, Bonds, Extra Stock, Permits, and Manuals.

1.3 SUBMITTALS:

- A. Project Record Documents:
 - 1. Submit documents to Owner. The following submittal procedure shall occur prior to Final Acceptance.
 - 2. Submit original copy of as-built drawings (Drawings & Specifications) to Owner for review.
 - 3. Compile and organize any drawings or schedules in the Project Manual onto sheets of the same size as the Contract Drawings and into electronic files to submit with other record documents.
 - 4. Contractor will be notified within 15 workdays if the submitted documents are acceptable.
 - 5. Should the submittal be unacceptable for any reason, the Contractor shall make requested modifications and resubmit to the Owner. Continue to resubmit as necessary until the submittal is acceptable.
 - 6. Upon acceptance of the submittal, Owners Engineer will, within 30 workdays, incorporate the Contractor's as-built drawings into the Owner's Engineer's original Contract Documents.

1.4 WARRANTIES, BONDS, EXTRA STOCK, AND PERMITS:

- A. Obtain and assemble executed certificates, warranties, bonds, receipts for extra stock, and permits signed by any authorities having jurisdiction. These may be tabbed in the front of the General Operation and Maintenance Manual provided they do not over-fill the binder.
- B. Verify that documents are in proper form and contain full information.
- C. Include originals of each in operation and maintenance manual, indexed separately on Table of Contents.

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- D. Co-execute submittals when required.
- E. Submittal of warranties, bonds, extra stock and permit manual to match submittal requirements.
- F. Provide Table of Contents neatly typed, in complete and orderly sequence. Include complete information for each of the following:
 - 1. Product or work item;
 - a. Firm, with name of principal, address, and telephone number;
 - b. Scope;
 - c. Date of beginning of warranty or service and maintenance contract;
 - d. Duration of warranty or service maintenance contract;
 - e. Proper procedure in case of failure;
 - f. Instances which might affect validity of warranty or bond; and
 - g. Contractor, name or responsible principal, address, and telephone number.
 - 2. Make submittals within ten days after Date of Substantial Completion.
 - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 - PRODUCTS

2.1 PROJECT RECORD DOCUMENTS:

- A. Project Record Documents include the following:
 - 1. Marked-up copies of Contract Drawings.
 - 2. Marked-up copies of Project Manuals (Specifications and Detail Book, as applicable), all volumes.
 - 3. Addenda.
 - 4. Reviewed and marked-up copies of shop drawings and product data.
 - 5. Newly prepared drawings.
 - 6. Change Orders, RFIs and other modifications to the Contract issued in printed form during construction.

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7. Owner's Representative's Clarifications and Pricing Request with all supporting documentation.
8. Field Authorizations.
9. Record Samples.
10. Field records for variable and concealed conditions.
11. Record information on Work that is recorded only schematically.
12. Manufacturer's instruction for assembly, installation, and adjusting.
13. Other miscellaneous record documents as listed below and applicable.
 - a. Field records on excavations and foundations.
 - b. Field records on underground construction and similar work.
 - c. Survey showing locations and elevations of underground lines.
 - d. Invert elevations of drainage piping.
 - e. Surveys establishing building lines and levels.
 - f. Authorized measurements utilizing unit prices or allowances.
 - g. Records of plant treatment.
 - h. Ambient and substrate condition tests.
 - i. Certifications received in lieu of labels on bulk products.
 - j. Batch mixing and bulk delivery records.
 - k. Testing and qualification of tradesmen.
 - l. Documented qualification of installation firms and/or personnel.
 - m. Load and performance testing.
 - n. Inspections and certifications by governing authorities.
 - o. Leakage and water-penetration tests.
 - p. Final inspection and correction procedures.

PART 3 -EXECUTION

3.1 PROJECT RECORD DOCUMENTS:

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A. Maintenance of Documents and Samples:

1. Store and maintain in field office apart from the Contract Documents used for construction, one complete set of record documents and samples which are used to record as-built conditions.
2. Do not use Project Record Documents for construction purposes; protect from deterioration and loss in a secure fire-resistant location. Maintain record documents in good order and in a clean, dry, legible condition.
3. Always make record documents and samples available for review by Owner's Representative and the Owner.
4. Record actual revisions to the Work concurrent with construction progress.
5. Ensure entries are complete and accurate, enabling future reference by Owner.
 - a. Following each month Progress Schedule Meeting, Contractor shall meet with all major subcontractors whose work is in progress at the site, including, but not limited to mechanical, plumbing, electrical, security, fire protection, civil, and as otherwise designated, to review all "as-built" revisions on the day-by-day working set of "Project Record Copy" and verify installed record information from the previous month is properly recorded on the day-by-day "Project Record Copy," with all revisions and pertinent information clearly indicated.

3.2 RECORD DRAWINGS AND SHOP DRAWINGS:

- A. A clean, undamaged set of Contract Drawings including coordination drawings and shop drawings shall be kept at the job site as "as-built" record documents. Record "as-built" drawings shall be comprised of all sheets contained in the Contract Drawings, as well as all special equipment or system drawings.
- B. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark whichever drawings that show conditions fully and accurately. Where shop drawings, RFIs or other communication record are used to identify a change, record a cross-reference at the corresponding location on the Contract.
- C. Drawings:
 1. Give attention to concealed elements that would be difficult to measure and record at a later date. Items required to be marked include, but are not limited to, the following:
 - a. Indicate field changes of dimension and detail.
 - b. RFIs.
 - c. Revisions to electrical circuitry.

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- d. Indicate details not on original Contract Drawings.
- e. "X-out" conditions not constructed and appropriately annotate "note constructed" to convey the actual "as-constructed" condition.
- 2. Mark record sets in a clear, legible manner, using red ink (no pencils); use other colors to distinguish between variations in separate categories of the work. Use 'whiteout' to erase errors.
- 3. Mark new information that is important to the Owner, but which was not shown on the Contract Documents or Shop Drawings.
- 4. Show Addenda items, Change Orders, RFI, or other means of communication used in the construction process.
- 5. Show and date revisions to drawings with a "cloud" drawn around the revision.
- 6. Organize record drawing sheets in manageable sets, bind with durable paper cover sheets, and print suitable titles, dates, and other identification on the cover of each set. Where shop drawings, RFIs, or other communication record is used as a reference, include a copy of it as part of the Record Drawings.
- 7. Shop Drawings:
 - a. Maintain as record documents; legibly annotate to record changes made after review.
 - b. Include subcontractor reproducible shop drawings including as a minimum where applicable to the project, and others as deemed appropriate. Record Drawing shop drawings shall be easily reproducible as appropriate and approved by the Owner.

3.3 PROJECT MANUAL(S):

- A. During the construction period, maintain one complete copy of the Project Manual(s), including Specifications, Detail Book(s), addenda, and one copy of other written Construction Documents, such as Change Orders, and RFIs issued in printed form during construction.
- B. Legibly mark these documents in red ink to show substantial variations in actual work performed in comparison with the text of the Specification and modifications. Give particular attention to substations, selection of options, and similar information on elements that are concealed or cannot otherwise be readily discerned later by direct observation. Note related Record Drawing information and product data. Record at each product section description of actual products installed, including the following:
 - C. Product substitutions or alternates utilized.
 - D. Changes made by Addenda and modifications.

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- E. Mark Detail Book schedules, details, etc., to indicate the actual installation where the installation varies from the indicated in the Detail Book and modification issued. Complete information in accordance with paragraph for all detail drawings.
- F. Each prime contractor (Subcontractor) is responsible for marking up Sections that contain its own Work.
- G. General Contractor shall be responsible for collecting marked-up Sections that contain its own work.
- H. General Contractor shall be responsible for submitting the complete set of record Specifications as specified.

3.4 RECORD PRODUCT DATA:

- A. Maintain one copy of each data Submittal, and mark-up variations in actual work in comparison with submitted information. Include both variations in product as delivered to the site, and variations from manufacturer's instruction and recommendations for installation.
- B. Give attention to concealed products and portions of the work which cannot otherwise be readily discerned at a later date by direct observation. Note related Change Orders and mark- up of Record Drawings and Project Manuals.
- C. Note related Change Orders and mark-up of record Drawings, where applicable.
- D. Upon completion of mark-up, submit complete set to Owner's Representative for Owner's records.
- E. Where record Product Data is required as part of maintenance manuals, submit marked-up Product Data as an insert in the manual instead of submittal as record Product Data.
- F. Each prime contractor (Subcontractor) shall be responsible for marking up and submitting record Product Data for its own Work.
- G. Insofar as possible, insert record product data in individual sub-sections of O&M Manuals. Refer to 3.05 below.

3.5 RECORD SAMPLE SUBMITTAL:

- A. Immediately prior to date(s) of substantial completion, Owner's Engineer will meet with Contractor at site, and will determine which (if any) of submitted samples maintained by Contractor during progress of the work are to be transmitted to Owner for record purposes. Comply with *NE's* instructions for packaging, identification marking, and delivery to Owner's sample storage place.

3.6 MISCELLANEOUS RECORD SUBMITTALS:

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- A. Refer to paragraph above for listing of miscellaneous record documents and to other Sections of these specifications for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the work. Immediately prior to date of Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to the Owner for their records.

3.7 OPERATION AND MAINTENANCE DATA- GENERAL:

- A. For Each Product:
 - List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies.

3.8 PRODUCT DATA:

- A. Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

3.9 DRAWINGS:

- A. Supplement product data to illustrate relations of component parts of systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

3.10 TYPED TEXT:

- A. As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.11 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS:

- A. Operation and maintenance information on drive motors

3.12 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES: (NOT USED)

3.13 OPERATION AND MAINTENANCE MANUALS: (NOT USED)

3.14 WARRANTIES, BONDS, AND PERMIT MANUAL:

- A. Project Warranty-General:
 - 1. If, within one (1) year after the Date of Substantial Completion of the Work, or designated portion thereof, or within such longer period of time as may be prescribed by law or by the terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be defective or not in accordance with the Contract Documents, the Contractor, and where applicable, his subcontractor that portion of the work, shall correct it promptly after receipt of a written notice from the Owner or Owner's Representative to do so. This obligation shall survive Termination of the Contract. The Owner will give such notice promptly after discovery of the condition.

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- B. Refer to Section 01 78 36 for administrative and procedural requirements for tracking project warranty issues subsequent to date of Substantial Completion.

3.15 CATEGORIES OF SPECIFIC WARRANTIES:

- A. Warranties on the work are in several categories, including those of General Conditions, and including (but not necessarily limited to) the following specific categories related to individual units of work specified in the technical sections of these specifications.

1. Special Project Warranty (Guarantee):

A warranty specifically written and signed by Contractor for a defined portion of the work; and, where required, countersigned by subcontractor, installer, manufacturer or other entity engaged by Contractor.

2. Specified Product Warranty:

A warranty which is required by contract documents, to be provided for a manufactured product incorporated into the work; regardless of whether manufacturer has published warranty without regard for specific incorporation of product into the work, or has written and executed warranty as a direct result of contract document requirements.

3. Coincidental Product Warranty:

A warranty which is not specifically required by contract documents (other than as specified in this section); but which is available on a product incorporated into the work, by virtue of the fact that manufacturer of product has published warranty in connection with purchases and uses of product without regard for specific applications except as otherwise limited by terms of warrantee.

- B. Refer to individual sections for the determination of units of work which are required to be specifically or individually warranted, and for the specific requirements and terms of those warranties (or guarantees).

3.16 DISCLAIMER AND LIMITATIONS:

- A. Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

3.17 GENERAL LIMITATIONS:

- A. It is recognized the specific warranties are intended primarily to protect the Owner against failure of the work to perform as required, and against deficient, defective, and faulty materials and workmanship, regardless of sources.

3.18 RELATED DAMAGES AND LOSSES:

- A. General:

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In connection with Contractor's correction of warranted work which has failed, remove and replace other work of project which has been damaged as a result of such failure, or must be removed and replaced to provide access for correction of warranted work.

B. Consequential Damages:

Except as otherwise indicated or required by governing regulations, Special project warranties and product warranties are not extended to cover damage to building contents (other than work of Contract), which occurs as a result of failure of warranted work.

C. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial completion is determined.

3.19 REINSTATEMENT OF WARRANTY PERIOD:

- A. Except as otherwise indicated, when work covered by a special project warranty or product warranty has failed and has been corrected by replacement or restoration, reinstate warranty by written endorsement for the time period starting on the date of acceptance of replaced or restored work and ending upon date original warranty would have expired if there had been no failure, with an equitable adjustment for depreciation.

3.20 REPLACEMENT COST, OBLIGATIONS:

- A. Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. Contractor shall be responsible for the cost of replacing or restoring defective Work regardless of whether the Owner has benefited from use of the Work through a portion of anticipated useful service life.

3.21 OWNER'S RECOURSE:

- A. Expressed warranties made to the Owner are in condition addition to implied warranties and shall not limit the duties, obligations, right, and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which the Owner can enforce such other duties, obligations, rights, or remedies.

3.22 REJECTION OF WARRANTIES:

- A. Owner reserves the right, at time of final acceptance or thereafter, to reject coincidental product warranties submitted by the Contractor, which in opinion of Owner tend to detract from or confuse interpretation of requirements of Contract Documents.

3.23 CONTRACTOR'S PROCUREMENT OBLIGATIONS:

- A. Do not purchase, subcontract for, or allow others to purchase or sub-contract for materials or units of work for project where a special project warranty, specified product warranty, certification or similar commitment is required, until it has been determined that entities required to countersign such commitments are willing to do so.

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- B. Co-execute warranties when required. Provide originals of each for inclusion in each operation and maintenance manual.
- C. Retain warranties and bonds until time specified for submittal.

END OF SECTION

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.1 REFERENCE STANDARDS

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.
- C. All materials, installation and workmanship shall comply with all applicable requirements and standards.

1.2 SUBMITTALS

- A. Record Documents:
 - 1. Schedule indicating proposed sequence of operations for selective demolition Work to Owner's Representative for review prior to start of Work. Include coordination for shutoff, capping, and continuation of utility services as required, together with details for dust and noise control protection.
 - a. Provide detailed sequence of demolition and removal Work to ensure uninterrupted progress of Owner's on-site operations.
 - b. Coordinate with Owner's continuing occupation of portions of existing building and with Owner's partial occupancy of completed new addition.
 - c. Photographs of existing conditions of structure surfaces, equipment, and adjacent improvements that might be misconstrued as damage related to removal operations. File with Owner's Representative prior to start of Work.

1.3 PROJECT CONDITIONS

- A. Owner will occupy portions of the building immediately adjacent to areas of selective demolition. Conduct selective demolition Work in manner that will minimize need for disruption of Owner's normal operations. Provide minimum of 72 hours advance notice to Owner of demolition activities that will affect Owner's normal operations.
- B. Owner assumes no responsibility for actual condition of items or structures to be demolished.

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1. Conditions existing at time of inspection for bidding purposes will be maintained by Owner insofar as practicable. However, minor variations within structure may occur by Owner's removal and salvage operations prior to start of selective demolition Work.
- C. Promptly repair damages caused to adjacent facilities by demolition Work.
- D. Conduct selective demolition operations and debris removal to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.
 1. Do not close, block, or otherwise obstruct streets, walks, or other occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- E. Do not use cutting torches for removal until Work area is cleared of flammable materials. At concealed spaces, such as interior of ducts and pipe spaces, verify condition of hidden space before starting flame cutting operations. Maintain portable fire suppression devices during flame cutting operations.
- F. Maintain existing utilities indicated to remain in service and protect them against damage during demolition operations.
 1. Do not interrupt utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.
 2. Maintain fire protection services during selective demolition operations.
 3. Use water sprinkling, temporary enclosures, and other methods to limit dust and dirt migration. Comply with governing regulations pertaining to environmental protection.
 - a. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

PART 2 - PRODUCTS

A. GENERAL

1. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

B. MATERIAL OWNERSHIP

1. Except for items or materials indicated to be reused, salvaged, or otherwise indicated to remain the Owner's property, demolished materials shall become the Contractor's property and shall be removed from the Site with further disposition of the Contractor's option.

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2. Historical items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to the Owner, which may be encountered during demolition, remain the Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to the Owner.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of areas to be demolished and adjacent facilities to remain.
- B. Cease operations and notify Owner's Representative immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations.
- C. Locate, identify, stub off, and disconnect utility services that are not indicated to remain.
 1. Provide bypass connections as necessary to maintain continuity of service to occupied areas of building. Provide minimum of 72 hours advance notice to Owner if shutdown of service is necessary during changeover.

3.2 INSTALLATION

- A. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.
- B. All installation shall be in accordance with manufacturer's published recommendations.

3.3 DEMOLITION

- A. Perform selective demolition Work in a systematic manner. Use such methods as required to complete Work indicated on Drawings in accordance with demolition schedule and governing regulations.
- B. Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain using power driven masonry saw or hand tools; do not use power driven impact tools.
- C. Locate demolition equipment throughout structure and promptly remove debris to avoid imposing excessive loads on supporting walls, floors, or framing.
- D. Provide services for effective air and water pollution controls as required by local authorities having jurisdiction.
- E. Demolish foundation walls to a depth of not less than 12 inches below existing ground surface. Demolish and remove below grade wood or metal construction. Break up below grade concrete slabs.

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- F. For interior slabs on grade, use removal methods that will not crack or structurally disturb adjacent slabs or partitions. Use power saw where possible.
- G. Completely fill below grade areas and voids resulting from demolition Work. Provide fill consisting of approved earth, gravel, or sand, free of trash and debris, stones over 6 inches in diameter, roots, or other organic matter.
- H. Remove culvert or sewer pipe for reuse by careful excavation of all material on the top and sides so that the pipe will not be damaged. Removal of sewer appurtenances shall be included for removal with the pipe. Remove pipe which are unsatisfactory for reuse, and dispose of, off the Project Site.
- I. Concrete parts of structures below the permanent ground-line shall be neatly squared off with reinforcement cut off close to the concrete.
- J. Dismantle steel structures or steel portions of structures in sections determined by the Owner's Representative.
 - 1. The sections shall be of such weight and dimensions which permit convenient handling, hauling and storing.
 - 2. Rivet and bolts connecting steel rail members, steel beams or girder spans and steel stringers of truss spans will be removed by cutting the heads with a cold cut then punching or drilling by a method that will not injure the member for reuse.
 - 3. The removal of rivets and bolts from connections will not be required unless specifically indicated.
 - 4. Unless otherwise specified, the Contractor shall have the option of dismantling these members by flame cutting immediately adjacent to the connection.
 - 5. Flame-cutting will not be permitted when Drawings call for the structural unit to be salvaged in such a manner as to permit re-erection. In such cases, all members shall be carefully dismantled without damage, match marked with paint, and all rivets and bolts removed from the connections.
- K. Remove brick and stone structures by sledging the masonry into removal sizes. Portions of such structures below the permanent ground-line, which will not in any manner interfere with the proposed construction, may be left in place, but removal shall be carried at least two feet below the permanent ground-line and neatly squared off.
- L. If unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to Owner's Representative in written, accurate detail. Pending receipt of directive from Owner's Representative, rearrange selective demolition schedule as necessary to continue overall job progress without undue delay.

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3.4 EXCAVATION AND BACKFILL

- A. Back-fill to the level of the original ground-line, all excavation made in, and all openings below, the natural ground-line caused by the removal of old structures or portions thereof.
- B. That portion of the back-fill which will support any portion of the roadbed or paving shall be placed in layers of the same thickness as those required subgrade preparation.
 - 1. Material in each layer shall be wetted uniformly, if required, and shall be compacted to the density required in the adjoining embankment. In places inaccessible to blading and rolling equipment, mechanical or hand tampers shall be used to obtain the required compaction.
 - 2. Place that portion of the back-fill which will not support any portion of the roadbed or paving in such a manner, and compact, to preclude settling.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove from building Site debris, rubbish, and other materials resulting from demolition operations. Transport and legally dispose off Site.
 - 1. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling, and protection against exposure or environmental pollution.
 - 2. Burning of removed materials is not permitted on the Project Site.

3.6 CLEANUP AND REPAIR

- A. Upon completion of demolition Work, remove tools, equipment, and demolished materials from the Project Site. Remove protections and leave interior areas broom clean.
- B. Repair demolition performed in excess of that required. Return elements of construction and surfaces to remain to condition existing prior to start operations. Repair adjacent construction or surfaces soiled or damaged by selective demolition Work.

END OF SECTION

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PART 1 -GENERAL

1.1 DESCRIPTION

A. Work Included in This Section:

1. Provide all labor, materials, equipment, and services, etc., required to furnish and install all cast-in-place plain and reinforced concrete work, as indicated on the Drawings, Specified herein, or otherwise required for a complete and proper job.

B. The Work shall include, but shall not necessarily be limited to:

1. Forms, shoring, reinforcing, reinforcing accessories, and form removal.
2. The furnishing, placing, finishing, curing, and protection of all above and below grade, plain and reinforced, architectural and non-architectural concrete including but not necessarily limited to:
 - a. Foundations and footings.

1.2 SUBMITTALS

A. Product Data:

Submit manufacturers' technical data, application, and installation instructions for each type of manufactured materials and product indicated.

1. Mix Designs: Submit concrete mix designs with two (2) cylinder test results by a qualified independent testing laboratory for each type of concrete to be used, not less than ten (10) days prior to placement. NOTE: If concrete is to be pumped, separate mix design(s) shall be required. If admixtures are to be included in the mix, provide mix design with test results. Indicate quantities of mix water for addition at project site.

B. Shop Drawings:

1. Submit reinforcing steel shop drawings detailing, bending, and placing of reinforcements, and bar lists in accordance with ACI 315 "Manual of Standard Practice for Detailing Concrete Structures".

C. Certificates:

. Submit material certificates signed by the manufacture certifying materials comply with the project requirements for the following:

1. Cementitious materials and aggregates.
2. Form materials and form release agents.
3. Steel reinforcement and reinforcement accessories.
4. Fiber reinforcement.

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- 5. Admixtures.
- 6. Curing materials.
- 7. Adhesives.

1.3 TESTING AND INSPECTIONS

- A. Testing and inspection shall be performed as required by the building code, the Contract Documents, or as otherwise directed by the Project Manager. The Contractor shall employ a testing laboratory for the purpose of testing concrete, inspecting reinforcements and submitting reports. The cost of testing and inspections shall be paid for by the Contractor.
- B. The Contractor shall arrange and coordinate all testing and inspections and shall give the Owner's Representative and Project Manager a minimum of forty-eight (48) hours notice before each concrete pour.
- C. Sampling and testing for quality control during concrete placement may include the following, as directed by the Project Manager:
 - 1. Slump: ASTM C-143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
 - 2. Air Content: ASTM C-173; volumetric method for light-weight or normal-weight concrete; ASTM C-231, pressure method for normal-weight concrete; one for each day's pour of each type of concrete mix.
 - 3. Concrete Temperature: ASTM C-1064; one test hourly when air temperature is 80 degrees F and above, and one test for each set of compressive strength specimens.
 - 4. Compression Test Specimen: ASTM C-31; one set of four standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field cured test specimens are required.
 - 5. Compressive Strength Tests: ASTM C-39; one set for each day's pour exceeding 5 cu.yd. plus additional sets for each 50 cu.yd. more than the first 25 cu.yd. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
 - a. Should tests yield compressive strengths equal to or exceeding 28-day minimum requirements, discontinue testing of remaining cylinders for that sample lot.
 - b. Specimens in reserve are to be disposed of upon completion of the Project.
 - 6. Unit Weight: ASTM C567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.

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- D. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.
- E. When total quantity of a given class of concrete is less than 50 cu. yd. the Project Manager may waive strength testing if adequate evidence of satisfactory strength is provided.
- F. When strength of field cured cylinders are less than 85 percent of companion laboratory cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in place concrete.
- G. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi.
- H. Test results will be reported in writing to the Owner's Representative, Project Manager, Structural Engineer, Contractor, concrete manufacturer, and Building Inspector within 2 working days. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions, and materials, compressive breaking strength, and type of break for both 7 day and 28 day tests.
- I. Contractor shall pay for testing conducted and any other additional testing as may be required when unacceptable concrete is verified.
- J. The Contractor shall remove and replace, or strengthen, as determined by the Project Manager, all concrete work for which test results fall below the specified requirements.
- K. Early (4-day) concrete cylinder breaks to facilitate the Contractor's schedule and operations shall be paid for by the Contractor.
- A. affect a satisfactory finish and/or adhesion of materials to be applied to concrete by other sections.

1.4 QUALITY ASSURANCE

- A. Codes and Standards:
All concrete shall be placed, cured, and tested in accordance with all applicable sections of the American Concrete Institute (ACI) specifications, latest edition.
- B. Pre-installation Meeting:
A pre-installation meeting to review cast-in-place concrete project requirements shall be attended by the Contractor, General Superintendent, Concrete Sub-contractor, Owner's Representative and Project Manager.

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1.5 PRODUCT HANDLING

A. Protection:

Protect materials during transit, on-site storage, and handling to prevent deterioration and damage. Reinforcing steel shall be stored off the ground in an orderly manner to facilitate access and usage in designated locations. Repair epoxy coating on steel reinforcement according to ASTM D3963 and ASTM D3963M.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

A. Forms for Exposed Concrete:

Shall be exterior grade plywood, equal to American Plywood Association B-B Plyform, in excellent condition, free of dents, scratches or surface deposits. Forms for architectural concrete shall be HDO (High Density Overlaid) Plyform, in "like-new" condition. Use appropriate thickness of Class I, II or Structural I Plyform as recommended by APA for specific installations.

B. Forms for Concealed Concrete:

May be Plyform, matched dressed lumber or steel.

C. Forms for Cylindrical Columns, Pedestals, and Supports:

Shall be metal, glass fiber reinforced plastic, paper or fiber tubes that shall provide surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

D. Form Release Agent:

Shall be a commercial formulation with a maximum of 350 mg/l volatile organic compounds that will not bond with, stain or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.2 REINFORCING MATERIALS

A. Reinforcing Bars:

Shall be deformed bars complying with ASTM A-615 A and M, Grade 60. Low alloy deformed steel reinforcing bars shall conform to STM A706 A and M. Fabricated deformed epoxy coated reinforcing shall comply with ASTM A934 A and M. Steel bar mats shall conform to ASTM A184 A and M, and shall be assembled with clips.

B. Supports for Reinforcement:

Shall include, but are not limited to: spacers, chairs, ties, bolsters, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric. Supports shall conform to CRSI "Manual of Standard Practice".

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic protected or CRSI Class 2 stainless steel bar supports.

2. For epoxy coated reinforcement, use epoxy coated or other dielectric polymer coated wire bar supports.

C. Joint Dowel Bars:

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Shall be plain steel bars conforming to ASTM A615 A and M, Grade 60, or epoxy coated bars conforming to ASTM A775A and M Grade 60, as indicated on the Drawings. Cut bars true to length with ends square and free of burrs.

2.3 CONCRETE MATERIALS

A. Portland Cement:

Shall comply with ASTM C-150, Type II. Only one brand of cement shall be used throughout the project.

B. Concrete Aggregates shall conform to the following requirements:

1. Coarse Aggregate (normal weight):

Shall comply with ASTM C-33 and consist of crushed stone or gravel having clean, hard, durable, uncoated particles, free from deleterious matter. Materials for exposed concrete shall come from a single source.

2. Coarse Aggregate (light weight):

Shall comply with ASTM C-33 and consist of cellular materials of mineral origin, such as shale, clay, slate, fly ash, or slag, either naturally occurring or produced by sintering, expansion, palletizing, or rotary kiln processes. Material shall have a dry loose weight of 55 lbs. per cu. ft. and graded from 3/4" to No. 4.

C. Mixing Water shall be potable.

D. Admixtures:

Shall be used in complete accordance with the manufacturer's directions. All admixtures shall be by the same manufacturer, who shall provide at no added cost to the Owner, the services of its representative at the job to ensure proper use of each particular admixture. No admixtures containing calcium chloride (chloride ions) shall be placed in concrete work. Admixtures shall be certified by the manufacturer to contain no more than 0.1 percent water soluble chloride ions by mass of cementitious materials, to be compatible with other admixtures and cementitious materials and to comply with the following:

1. Air-entraining: ASTM C-260.

2. Water-reducing: ASTM C-494, Type A

3. High-range, Water-reducing: ASTM C494, Type F.

4. Water-reducing and accelerating: ASTM C494, Type E.

5. Water-reducing and retarding: ASTM C494, Type D.

6. Corrosion-inhibiting:

Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor, capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

2.4 RELATED MATERIALS

A. Curing Membrane shall be one of the following:

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1. White polyethylene sheeting 4 mils thick, ASTM C171; or
2. Waterproof paper, Sisalkraft Type, ASTM C171-69 as manufactured by Fortifiber Corp., Ludlow Papers, Glas-Kraft; or

PART 3 - EXECUTION

3.1 PROPORTIONS

- A. All concrete shall be ready-mixed controlled concrete and proportioned according to ACI 211 and ACI 301 for normal-weight concrete and light-weight concrete.
- B. The nominal maximum size of the aggregate shall not be larger than one-fifth of the narrowest dimension between sides of forms, one-third of the depth of slabs, nor three-fourths of the minimum clear distance between reinforcing bars or between bars and forms, whichever is least. In general, 3/4" size will satisfy these requirements. Aggregate of 1-1/2" size shall be used for slabs on grade, which are 5" or more in thickness.
- C. Concrete for every part of the Work shall be a homogeneous structure which, when cured, will have at least the strength required by design. The limiting values of concrete shown in Table A and the requirements hereinafter specified must be met.
- D. The design strength of the concrete in this structure is based upon ultimate strength requirements of ACI 318. The minimum strength requirement stated is the strength of the concrete at 28 days when samples are cured and tested in accordance with the recommended standards of ACI 318.
- E. By the water-cement ratio is meant the total quantity of water entering the mixture, including the surface water carried by the aggregates, expressed in terms of the quantity of cement.
- F. All concrete exposed to the exterior shall be air-entrained concrete, typically 6% +/- 1% by volume for 3/4" aggregate and 8% +/- 1% for 3/8" aggregate. Maximum air-entrainment for exterior slabs shall be 3%. Interior floor slabs shall not be air entrained.
- G. The water-cement ratio shall be expressed in U.S. gallons per sack (94 lb net) of cement.

TABLE A

Minimum Allowable Compressive Strength @ 28 Days PSI	Maximum Allowable Net Water Content Gals/Sack*	Cement Sacks Per CU. YD. Minimum Permissible **	Total Water Maximum
3500	3.5	6.0	21.0 gal/CY
4000	4.0	6.5	26.0 gal/CY

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* Maximum: Decrease if possible. This represents the total water in the mix at the time of mixing, and includes free water on aggregates. Reduce net allowable water content by one gallon for air-entrained concrete.

** Minimum: Increase as necessary to meet other requirements.

H. Design mix reports shall include the following information:

1. Identification of aggregate source of supply.
2. Tests of aggregate for compliance with specified requirements.
3. Scale weight of each aggregate.
4. Absorbed water in each aggregate.
5. Brand, type and composition of cement.
6. Brand, type and amount of each admixture.
7. Amounts of water used in trial mixes.
8. Proportions of each material per cu. yd.
9. Gross weight and yield per cubic yard of trial mixtures.
10. Measured slump.
11. Compressive strength results of 2 representative samples at 7 and 28 days for each type of concrete to be used.

3.2 STRENGTH COMPLIANCE

A. The following more clearly defines performance:

1. To meet the requirements of this Specification and those of ACI 318, the average of any three consecutive strength tests of laboratory-cured specimens representing each class of concrete shall be equal to or greater than the specified strength (f_c), and not more than one out of ten strength tests shall have a value of less than the specified minimum strength. In addition to the above requirement, the allowed 10% of tests below the minimum required strength shall be equal to or greater than 90% of the minimum specified strength (f_c).
2. Should the strengths shown by the test specimens fall below the specified design strengths, the Project Manager shall have the right to require additional curing on those portions of the structure represented by those test specimens.

3.3 DESIGN OF FORMWORK

A. The design, engineering, and safety of formwork, as well as its construction shall be the exclusive responsibility of the Contractor.

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- B. Exercise care in order to ensure that all formwork is properly designed, engineered and erected, and capable of safely supporting all loads and pressures. Forms shall be held to the dimensions indicated on the Drawings, with the tolerances established by ACI 117 concrete surface irregularities shall be limited as designated by ACI 347R.
- C. Temporary openings shall be provided at the base of forms and at other points where necessary to facilitate cleaning and observation immediately before concrete is deposited.
- D. Forms shall be sufficiently tight to prevent leakage of grout or cement paste.
- E. Properly set and secure all embedded items to be furnished by other trades.
- F. Properly set and secure all form applications for chamfers, reglets, rustication joints, etc., as indicated on the Drawings. Chamfer exterior corners and edges of permanently exposed concrete.

3.4 PREPARATION OF FORM SURFACES AND EMBEDDING ITEMS

- A. Plywood and other wood surfaces not subject to shrinkage shall be sealed against absorption of moisture from the concrete by either: (1) a field applied approved form oil or sealer; or, (2) a factory applied non-absorbent liner. All shall be subject to review for finish appearance.
- B. All forms shall be thoroughly cleaned before reuse.

3.5 CONCRETE REINFORCEMENT

- A. Reinforcing bars to be embedded in concrete shall be free of oil, dirt, loose mill scale, and loose rust. Reinforcing bars with rust, mill scale, or a combination of both will be acceptable as being satisfactory with cleaning or brushing, provided that upon wire brushing, the dimensions including height of deformations and weights of a cleaned sample shall not be less than the applicable ASTM specification requirements.
- B. The placement of bars shall conform to CRSI Manual of Standard Practice, Placing Reinforcing Bars. Maintain adequate space for proper concrete cover.
- C. All splicing of bars, concrete cover, and bar spacing shall conform to "Building Code Requirements for Reinforced Concrete" (ACI 318) as published by the American Concrete Institute, and to recommended practices in "Splicing Reinforcing Bars" by the Concrete Reinforcing Steel Institute, or as hereinafter specified.
 - 1. When necessary to splice reinforcement, bars shall be lapped at least 40 bar diameters, unless noted otherwise, placed in contact and wired. Laps shall be avoided at points of maximum stress. All rods shall be securely wired together at all intersections. No permanent device for fastening reinforcement shall be left in contact with the face of forms at exposed surfaces.

3.6 MIXING

- A. Ready-mixed concrete shall be mixed and delivered in accordance with the requirements set for it in ASTM C94 and ACI 614.

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- B. Transit-mixed concrete shall be delivered in high-lift trucks to enable it to be easily deposited in the forms.
- C. The mixing shall be continuous after the water has been added to the mix in the drum, but no concrete shall be placed in the forms more than 90 minutes after the water has been added.

3.7 CONSISTENCY

- A. The consistency of the concrete is mainly dependent upon the thoroughness of the mixing and the quantity of water contained in the mix. In general, the maximum slump and minimum strengths shall be as follows:

Type of Construction	Compressive Strength Required in PSI	Maximum Slump (inches)
All Exterior Concrete	3500 (air entrained)	4
Beams and Columns	3500	4
Footings	3000	4
Foundation Walls	3000	4
Slabs	4000	4
Miscellaneous Concrete	3500	4

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3.8 CONCRETE PLACEMENT

A. Inspection:

Prior to placing concrete, all formwork, reinforcements and embedded items shall be complete and inspected by the inspection agency

B. Prior to placing concrete:

Clean all equipment used for mixing and transporting the concrete. Remove all debris from the place to be occupied by the concrete, and check forms for dimensions, position, and adequacy.

C. Concrete Placement:

1. Concrete shall not be placed by means of open chutes, the combined length of which exceeds 30', and shall not be allowed to drop freely through distances exceeding 6' or through loosely spaced reinforcing bars, conduits, etc., which will tend to segregate materials.
2. Place concrete as nearly as practicable in its final position to avoid segregation due to handling or flowing. No concrete that has partially hardened or been contaminated by foreign material shall be deposited on the Work.
3. Once concrete placement is started, it shall be carried on as a continuous operation until the placing of the panel, section, or individual foundation is completed, so as not to cause formation of seams and planes of weakness within the section. If a section cannot be placed continuously, construction joints as specified and as detailed on the Drawings shall be provided. The top surface shall be generally level. When construction joints are necessary, they shall be made in as specified herein.
4. Place concrete in layers not over 12" deep, and thoroughly compact by means of vibrators, hand tamping and spading. During the operation of placing, thoroughly work the concrete around reinforcement, embedded fixtures, pipes, and conduits, and into the corners of the forms so as to prevent interior voids, honeycomb, and the patching of concrete surfaces after forms are removed. Internal vibrators should be used to aid in the compaction of the concrete. Extreme care shall be used on thin sections and exposed concrete.

3.9 WEATHER PROTECTION

- A.** Unless adequate protection is provided and/or approval is obtained, concrete shall not be placed during rain. Rainwater shall not be allowed to increase the mixing water or to damage the surface finish.

B. Hot Weather Concrete Placement:

1. Hot weather concrete placement shall be done in accordance with the recommendations of ACI 305R.
2. Concrete deposited in hot weather shall have a material temperature that will not cause difficulty from loss of slump, flash set, or cold joints (less than 90 degrees F).

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3. In hot weather, be adequately prepared to protect the concrete from the adverse influence of heat before the placement of any concrete. Take precautions to avoid cracking of the concrete from rapid drying during placement of concrete, particularly when the work is exposed to direct sunlight.
 - a. Cool forms by fogging with water spray or by protecting them from the direct rays of the sun.
 - b. If requested by the Contractor, deemed advisable by the Testing Engineer, and approved by the Project Manager, a retardant may be used to delay the initial set of the mix.

3.10 CONCRETE JOINTS

- A. Construction joints shall be located so as to least impair the strength and water tightness of the structure. All construction joint locations shall be subject to the notification of and acceptance by the Project Manager, prior to placement.
- B. All construction placement joints shall be keyed.
- C. Reinforcement shall be continuous through construction joints and additional reinforcing placed as required. Except where otherwise specified, the surfaces of construction joints shall be prepared in a manner that will ensure bonding with concrete or grout placed on them. Wherever practical, construction joint surfaces shall be kept continuously moist until new concrete or grout is placed.
- D. Use bonding agent on existing concrete surfaces to be joined with new concrete. Use a epoxy bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

3.11 REMOVAL OF FORMS

- A. Formwork not supporting the weight of concrete, such as sides of beams, walls, and similar parts of the work, may be removed 48 hours after placing the concrete, provided the concrete is sufficiently hard to not be damaged by the form removal operations, and provided that curing and protection operations are maintained.
- B. Removal of forms shall be in a manner to ensure safety of structure and prevent damage to concrete surfaces. Particular care shall be taken in the removal of forms for concrete surfaces to remain exposed.
- C. Whenever the formwork is removed during the curing period, the exposed concrete shall be cured by one of the methods specified.
- D. Formwork for beams, joist, slabs and other structural elements that support weight of concrete in place shall be left in place until the concrete has achieved at least 70 percent of its 28 day design compressive strength, as determined by testing specimens in accordance with ACI 301. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

3.12 FINISHING FORMED NON-ARCHITECTURAL CONCRETE SURFACES

- A. Rough-Formed Finish:

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For concealed non-architectural finish on formed concrete with texture imparted by form material, repair tie holes and defective areas and chip off fins and projections exceeding 1/4 inch in height.

B. Smooth-Formed Finish:

For exposed non-architectural finish on select formed concrete and for concrete surfaces to receive a direct coating material such as waterproofing, damp proofing, veneer plaster, painting, etc. Immediately upon removal of forms, point all form tie holes and other defects flush with surface and remove all fins and projections exceeding 1/8" for a smooth surface, or as otherwise directed by the Project Manager.

3.13 CURING AND PROTECTION

- A. Protect newly placed concrete against low and high temperature effects and against rapid loss of moisture. In hot, dry, and windy weather protect concrete from rapid moisture loss before and during finishing operations with evaporation-control materials. Apply according to manufacturer's instructions, after screeding and bull floating, but before power floating and troweling.
- B. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Cure concrete by curing compound, by moist curing, by moisture-retaining cover curing, or by combining these methods. Moist curing shall include keeping concrete surfaces continuously wet by covering with water; using a continuous water-fog spray; or covering the concrete surface with continuously wetted burlap.
- 4. Curing Formed Surfaces: Moist cure with forms in place for the full seven day curing period. If the forms are removed prior to seven days, apply curing compound and cure in accordance with manufacturer's written instructions. Intermittent wetting and drying does not provide acceptable curing. Keep steel forms heated by the sun, and all wood forms in contact with the concrete, wet during the curing period.
- C. Form Removal Not Supporting Weight of Concrete (footings, walls): May be removed after curing for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provide curing and protection operations are maintained.

3.14 CONCRETE SURFACE REPAIRS

A. Repairing Formed Surfaces:

- 1. Remove and replace concrete that cannot be repaired and patched to Project Manager's approval. Repair and patch defective areas with cement mortar immediately after removing forms. Mix dry-pack mortar, consisting of one-part Portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing.

END OF SECTION

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PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included in this Section:

1. Provide all engineering, labor, materials, equipment, and services, etc., required to engineer, furnish, and install all miscellaneous metal work and related accessories as indicated on the Drawings, specified herein, or otherwise required for a complete and proper job.
2. The Work shall include, but shall not necessarily be limited to:
 - a. Miscellaneous structural steel.
 - b. Miscellaneous steel plates and angles.
 - c. Miscellaneous steel brake metal, pans, closures, trim, and other configurations.
 - d. Miscellaneous carpenter's iron as required.
 - e. Miscellaneous frames, brackets, and supports for hardware, window systems, and equipment including all mechanical and electrical equipment. Including seismic bracing for all miscellaneous metal frames, stands, and supports.
 - f. Miscellaneous frames and supports for special doors, operable walls, mesh partitions, overhead supported toilet partitions.
 - g. Loose lintels and relieving angles.
 - h. Steel handrails and guardrails.
 - i. Bollards.
 - j. Expanded steel treads and landings.
 - k. Abrasive nosing for concrete stairs.
 - l. Support frames for benches and counters.
 - m. Roof blocking fastening requirements.
3. It shall be a requirement of the Work of this Section to thoroughly review all of the Contract Documents and provide any and all miscellaneous metal work required for a complete and proper job.

B. Related Work Specified Elsewhere:

1. SECTION 03300: CAST-IN-PLACE CONCRETE
2. DIVISION 23: MECHANICAL

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3. DIVISION 26: ELECTRICAL

1.2 SUBMITTALS

A. Product Data:

Submit product data for manufactured products specified herein.

B. Shop Drawings:

1. Submit shop drawings for each item or assembly. Shop drawings shall accurately and clearly show in detail the construction, sizes, gauges, dimensions, methods of assembly, supports, finishes, and all other pertinent data and information.

a. Submit stair and railing shop drawings drawn at not less than 20' to 1" scale with components shown in related positions. Provide larger scale custom details, control details and dimensions not governed by job conditions. Show all required field measurements.

C. Certifications:

1. Submit manufacturer's certification that the stairs, platforms, and railings provided are in full compliance with the requirements of the Contract Documents and are totally suitable for the proposed installations when installed in accordance with the shop drawings.

2. Submit certificates indicating that each welder has satisfactorily passed AWS qualification tests for welding processes involved and if pertinent, has undergone re-certification.

3. Steel fabricator's in-plant special inspections program including: registration of special inspections program, written procedural and quality control manuals and evidence of periodic auditing of fabrication practices by an approved inspection agency.

1.3 PRODUCT HANDLING

A. Delivery of Materials:

Deliver, store and handle components in such a manner as to prevent damage to finished surfaces.

B. Storage of Materials:

Store components in a dry, clean location, away from uncured masonry and concrete. Cover with tarpaulin or polyethylene sheeting.

1.4 QUALITY ASSURANCE

A. Welding Standards:

Comply with applicable provisions of ASW D1.1 "Structural Welding Code- Steel" and ASW D1.3 "Structural Welding Code Sheet Steel."

B. Stair and railing fabricator shall be a certified member of AISC who participates in a recognized quality assurance program and who is regularly inspected by an independent testing/inspection agency.

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1. In the absence of the above requirements, the fabricator shall be required to hire and pay for an independent testing/inspection agency approved by the Owner, to monitor fabrication and perform random testing of all stairs and railing fabrication procedures.
 2. The fabricator shall submit evidence to the Owner indicating satisfactory completion of projects of similar scope and that fabrication facilities are adequate to meet production requirements.
- C. Fabricator's Qualifications:
Only fabricators that maintain an agreement with an approved independent inspection or quality control agency to conduct periodic in-plant inspections at the fabricator's plant, at a frequency that will assure the fabricator's conformance to the requirements of the inspection agency's approved quality control program will be approved for this project.

1.5 TESTING AND INSPECTIONS

- A. General:
Stair and railing materials and fabrication procedures are subject to inspection and tests in mill, shop, and field, conducted by a qualified testing agency. Such inspections and tests shall not relieve the Contractor of responsibility for providing his own inspections, quality control and materials and fabrication procedures in compliance with specified requirements. Any non-compliant materials or fabricated components shall be removed and replaced.
- B. The fabricator shall submit evidence of in-plant inspections in conformance with IBC "Structural Tests and Inspections- Inspection of Fabricators (1700).
- C. Testing and inspection shall be formed as required by the building code, the Contract Documents or as otherwise directed by the Project Manager. The cost of field-testing and inspection shall be paid for by the Owner. If Work is found not to conform to the Contract Documents, the Contractor shall be responsible for the cost of all further testing.
- D. The Contractor shall cooperate with and facilitate testing and inspection by the testing agency. The Contractor shall, at his own expense, furnish the testing agency stair and railing shop drawings.
- E. Shop and field bolted connections and shop and field welded connections shall be inspected.

1.6 STRUCTURAL PERFORMANCE

- A. Handrails and Guardrails:
Engineer, fabricate, and install handrails and guardrails to comply with requirements of ASTM E985. ASTM E894 and to withstand the following structural loads without exceeding the allowable design working stress of the materials involved including anchors and connections. Apply each load to produce the maximum stress in each of component.
1. Handrails shall be rigid, free of vibration and able to withstand a concentrated force of 200 pounds applied at any point in any direction and, but not simultaneously, a uniform load of 50 pounds per foot applied in any direction.

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2. Top Guardrails Member shall be rigid and able to withstand a concentrated force of 200 pounds applied at any point and in any direction and, but not simultaneously, a uniform load of 50 pounds per foot applied in any direction, and a simultaneous uniform load of 100 pounds per foot applied vertically downward to the top of the guard.

a. Infill areas of guardrails shall be rigid and able to withstand a horizontal concentrated force of 200 pounds applied on one square foot at any point in the system including panels, intermediate rails, balusters, or other elements. This loading condition shall not be applied simultaneously with the other loading conditions for guardrails.

b. Guardrail System shall withstand stresses resulting from railing system loads specified above.

1.7 WARRANTIES

A. Color Galvanizing:

Provide manufacturer's standard product warrant against excessive corrosion, peeling, chipping, or other failure for a period of twenty (20) years.

PART 2 - PRODUCTS ("GREEN")

2.1 GENERAL

A. Note:

It is the Owner's intent to use energy conserving, environmentally friendly materials to the greatest extent practical. The Contractor is therefore encouraged to use recycled steel products.

B. Miscellaneous metal items shall be standard approved products, fabricated in accordance with best shop practices and, wherever possible, shop assembled, ready for erection.

C. Metals shall be free from defects impairing strength, durability, or appearance and shall be best commercial quality for purposes specified. Metals shall be made with structural properties to safely sustain and withstand strains, stresses, to which they will be normally subjected.

D. Gauges herein specified are minimums and shall refer to U. S. Standard for sheet steel, plate iron, and steel.

2.2 MATERIALS

A. Steel Plates, Shapes and Bars:

ASTM A-36.

B. Sheet Steel:

Cold-rolled: ASTM A-366

Hot-rolled: ASTM A-569

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C. Steel Tubing:

Cold-formed: ASTM A-500

Hot-formed: ASTM A-501

D. Steel Pipe:

ASTM A-53.

E. Fasteners:

Provide plated fasteners complying with ASTM A 240/A 666, Stainless Steel Type 316, for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required.

1. Bolts and Nuts:

ASTM A307, Grade A

ASTM A563.

2. Machine Screws:

ANSI B18.6.3.

3. Lag Bolts:

ANSI B18.2.1.

4. Plain Washers:

Round, carbon steel, ANSI B18.22.1.

5. Lock Washers:

Helical, spring type, carbon steel, ANSI B18.21.1.

6. Expansion Anchors:

Carbon steel components zinc-plated to comply with ASTM B633.

F. Note:

The fabricator shall no stamp, stencil, or otherwise place his identification on any portion of miscellaneous metals intended to remain exposed to view.

2.3 PAINTING AND PROTECTIVE COATING

A. General:

All ferrous metal that is not stainless steel herein specified shall be properly cleaned and shop primed, except at the following locations:

1. Anchors that are built into masonry shall be coated with bituminous paint, unless specified to be galvanized.
2. Ferrous metal to be encased in concrete shall be left unpainted, unless specified or noted otherwise. Aluminum to be encased in concrete shall be coated with bituminous paint.
3. Where hot-dip galvanized metal is specified or shown, it shall not be shop primed.

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4. Where sprayed-on fireproofing is specified or shown, metal shall not be shop primed.

5. Where metal is scheduled to receive ceramic tile finish it shall not be shop primed.

B. Surface Preparation:

1. Exterior steel shall meet requirements of the Steel Structures Painting Council, SS PC-SP6 Commercial Blast Cleaning Standard.

C. Shop Primer for Ferrous Metal shall be Tnemec "37 H Chem Prime Universal Phenolic Primer," at 2.0- 3.0 mils DFT.

D. For items that are not stainless steel. Galvanizing Repair Paint shall be high zinc content paint Tnemec 90-97.

2.4 GALVANIZING

A. All exterior steel, including lintels, rails, bollards, grates, frames, and all other steel that has any portion exposed to the weather, shall be hot-dip galvanized or stainless steel. Interior steel shall be hot-dip galvanized where so noted or specified. Hot-dip galvanized products shall not be shop primed.

B. Products fabricated from rolled, pressed and forged steel shapes, plates, bars and strips shall be hot-dip galvanized in accordance with ASTM A-123, latest edition.

C. Iron and steel hardware shall be hot-dip galvanized in accordance with ASTM A-153, latest edition.

D. Assembled steel products shall be hot-dip galvanized in accordance with ASTM A-386, latest edition.

E. The weight of coating shall be as designated in ASTM "Comparison of Coating Weight Requirements for Hot- Dip Galvanized Products" in accordance with the class and thickness of material.

F. Where hot-dip galvanizing prior to completion of fabrication (cutting or welding operations) cannot be avoided, joints and cuts shall be finished with four (4) full coats of touch-up galvanizing repair paint as recommended by the fabricator.

G. Hot-dip galvanizing shall be done by a member of the American Galvanizers Association, Inc.

H. All hot-dipped galvanized material shall be stamped to indicate ASTM designation and ounces per square foot of zinc coating required by the Specifications.

I. A notarized affidavit of compliance to the galvanizing specified shall be submitted from the galvanizer upon request.

J. The galvanizing bath shall contain high grade zinc and other early materials. Immediately before galvanizing the steel shall be immersed in a bath of zinc ammonium chloride. The use of wet kettle process is prohibited.

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2.5 SHOP COATING OF GALVANIZED STEEL

- A. The following miscellaneous metal components shall receive factory applied architectural finish over hot-dip galvanizing:

1. All exterior rails.
2. All exterior bollards.

- B. Finish shall be "Primergalv" by Duncan Galvanizing, or approved equal. Colors shall be selected by the Project Manager from the manufacturer's full range of available colors. Coating shall maintain a pull-off strength of 500 psi when tested in accordance with ASTM D4541.

1. Factory-Applied Universal Primer:

Where galvanized steel is specified to receive a factory primer for field applied topcoat, provide factory-applied polyamide epoxy primer over specially prepared galvanized steel, 2.0 mils dry film thickness minimum. Apply primer within 12 hours after galvanizing at the galvanizer's plant in a controlled environment meeting applicable environmental regulations, and as recommended by the coating manufacturer.

2. Factory-Applied High-Performance Architectural Finish:

Where galvanized steel is specified to receive a factory applied architectural finish, provide factory-applied polyurethane color coating, 2.5 mils dry film thickness minimum, over primed galvanized steel as previously referenced. Apply coating at the galvanizer's plant, immediately after the application of the prime coat, in a controlled environment meeting applicable environmental regulations, and as recommended by coating manufacturer.

2.6 ROOF BLOCKING FASTENING REQUIREMENTS

- A. Perimeter roof blocking shall be secured to decking, structural steel, spaced steel angles, or plates, as indicated on the Drawings.
- B. The Contractor shall provide additional steel angles and plates to suit specific job conditions.
- C. Where joist or beams do not extend out of roof edge, provide single or back-to-back steel angles or steel plates welded to perimeter steel beams in configurations indicated on the Drawings or otherwise required for support of blocking at 2'-0" O.C. intervals. Provide pre-drilled holes in steel for bolting of blocking at 24" O.C. with ½" bolts.

2.7 MISCELLANEOUS FRAMING AND SUPPORTS

- A. Provide steel framing and supports for applications indicated that are not a part of structural steel scope as required to complete the Work. Fabricate units to sizes, shapes, and profiles indicated and required to receive adjacent construction. Fabricate from steel shapes, plates, and steel bars of welded construction using mitered joints for field connections. Cut, drill, and tap units to receive hardware, hangers, and similar items.

- 1.

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2.8 BOLLARDS

- A. Unless otherwise indicated on the Drawings, bollards shall be six (6") inches diameter galvanized steel pipe (to be filled with concrete). Bollards shall be not less than 6'-6" in length with 3'-6" exposed above finish grade.

2.9 METAL CHANNEL FRAMING SYSTEMS (UNISTRUT)

- A. Various building materials and equipment such as suspended lights and service columns shall be provided with concealed metal channel framing systems as required to permanently and safely anchor such items to suitable building primary structural components.
- B. Metal channel framing systems shall be Unistrut Metal Framing as manufactured by UNISTRUT Corporation or approved equal. Framing shall be electrogalvanized steel. Systems shall be complete and shall be properly engineered, fabricated, and installed by the manufacturer or its authorized representative/installer. Installer shall have not less than five (5) years' experience.
- C. The Work of Channel Framing systems shall include, but shall not necessarily be limited to:
 - 1. Field inspection to verify job conditions, dimensions, and suitability of primary structure to receive channel framing.
 - 2. Engineering of all channel framing, attachments between framing members, attachments between framing systems and building structure, and anchor points to receive attachments by the manufacturer of the building material or equivalent to be supported by the channel framing systems.
 - 3. Coordination of framing load capacity and anchor point types and locations with the requirements of the related material or equipment manufacturer.
 - 4. Submission of structural calculations including, but not limited to design criteria, stress and deflection analysis and selected framing, fittings and anchors prepared by a professional structural engineer licensed in the United States of America or the United States Virgin Islands.
 - 5. Submission of shop drawings.

2.10 LOOSE STEEL LINTELS

- A. Loose lintels shall be fabricated from A-36 steel from angles, shapes and masonry anchors of size and type scheduled for openings in masonry walls, unless otherwise indicated on the Drawings.
- B. All dimensions for locations of rails shall be field measured. Drawing dimensions shall be considered approximate and actual field conditions shall be ascertained before fabrication of rails.
- C. In general, heights of handrails shall be 2'-10" above step nosing. Heights of guardrails shall be 3'-6" above finish floor, unless otherwise noted on the Drawings. Handrails shall be mounted to provide 2-1/4" minimum clear space to walls or other surfaces at stairs and 1-1/2" minimum clear space at all other locations.

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- D. Space intermediate balusters as indicated on the Drawings or as otherwise required providing maximum clear space between all members of less than four (4") inches. Space railing posts as indicated on the Drawings, and in accordance with railing engineering requirements.
- E. In general, handrails at stairs shall extend a minimum of 12" beyond the top riser and at least 12" plus the width of one tread beyond the bottom riser. At the top, the handrail extension shall be parallel to the working surface. At the bottom, the handrail shall continue to slope for a distance of the width of one tread from the bottom riser, with the remainder parallel to the walking surface.
- F. In general, handrails at ramps shall be parallel to the walking surface at all locations and shall extend a minimum of 12" beyond the top of the ramp and at least 12" beyond the bottom of the ramp.
- G. Steel Railing Fittings shall be as per Julius Blum and Co., or approved equal. All fittings for exterior use shall be galvanized. Fittings shall be:
 - 1. Weld on caps:
No. 938
 - 2. Round slip flanges:
No. 611 and No. 1611
 - 3. Wall returns:
No. 665 and No. 1665
 - 4. Brackets:
No. 386 and No. 1386

PART 3 - EXECUTION

3.1 VERIFYING CONDITIONS

- A. Coordinate all work with the work of other trades. Verify all field dimensions and that the work fits the work of other trades. Perform all cutting, fitting, and drilling required. Furnish all necessary templates and patterns required to build items into work of other trades. Provide holes and connections for the attachment of work of other trades.

3.2 GENERAL FABRICATION AND INSTALLATION

- A. Metal surfaces shall be clean and free from mill scale, flake rust, and rust pitting, well-formed and finished to shape and size, with sharp lines and angles and smooth surfaces. Shearing and punching shall leave clean true lines and surfaces. Weld or rivet permanent connections. Welds and flush rivets shall be finished flush and smooth on surfaces that will be exposed after installation. Welds shall be continuous unless otherwise noted. Welds shall not have voids or pockets and shall be ground to provide smooth transitions between metal surfaces. Do not use screws or bolts where they can be avoided; where used, heads shall be countersunk, screwed up tight and threads nicked to prevent loosening.

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- B. Fastenings shall be concealed where practicable. Thickness of metal and details of assembly and supports shall give ample strength and stiffness. Joints exposed to weather shall be formed to exclude water. Provide holes and connections for the work of other trades.
- C. Castings shall be size determined by work type for which they form parts. Each member if possible, shall be in one piece, make joints at moldings or fillets. Casting thickness shall be uniform, sufficient to ensure perfect workmanship, required strength for design use. Make castings clean, smooth, true to pattern, free from defects. Moldings, ornaments shall be rather more deeply cut than indicated to counteract flattening effects of casting, finishing; exactly reproduce form, feeling of models. Edges shall be sharp, come from molds clean, smooth, perfect.
- D. Connections and accessories shall be adequate to safely sustain, withstand stresses, strains, to which they will be normally subjected.
 - 1. Connections to steel unless otherwise specified shall be steel.
 - 2. Connections to genuine wrought iron work shall be wrought iron or steel.
 - 3. Connections to cast iron, unless otherwise specified shall be steel.
 - 4. Bolts, nuts, screws for exterior work shall be electrogalvanized, unless otherwise noted.
- E. Furnish all standard screws, bolts, washers, and other such fastening devices as are necessary for attaching this work to other materials.
- F. Do cutting, punching, drilling, tapping required for attachment of other work coming in contact with miscellaneous metal where indicated or where directions for same are given prior to or with review of shop drawings.
- G. Unless otherwise indicated, bolt, and screw heads shall be flat countersunk in exposed faces of ornamental or finished character; elsewhere as required. Cut off bolts, screws, etc., where exposed, flush with nuts, or other adjacent metal. Except as otherwise required, weld shop-assembled connections; welds, bolts, or machine screws may be used for field connections. Exposed fastenings shall be the same materials, color, and finish as metal to which they apply, unless otherwise required.
- H. Make up threaded connections tightly so that threads will be entirely concealed by fittings.
- I. Install all supporting members, fastening, framing, hangers, bracing, brackets, straps, bolts, angles, and the like required to set, connect work rigidly and properly to structural steel, masonry, other construction.
- J. All items shall be installed plumb, straight, square, level and in proper elevation, plane, location and alignment with other work.

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3.3 STEEL RAILING FABRICATION AND INSTALLATION

- A. Fabricate railing systems to comply with the requirements indicated for design, dimensions, details, finish, member sizes and anchorage but not less than that required to support structural loads.
- B. All exterior rails, fittings and brackets shall be hot-dipped galvanized after fabrication.
- C. Set rails plumb and aligned.
- D. Provide expansion joints in railings at intervals not to exceed forty (40') feet.

3.4 EXPANSION JOINT COVERS

- A. Covers shall extend full width of openings.
- B. Covers shall be installed level, plumb, and flush with finish surfaces, and shall be fastened with anchor shields and bolts in strict confidence with the manufacturer's instructions and recommendations.
- C. Provide all corners, tees, transitions, etc., as required for a complete and proper job.
- D. Provide fire rated expansion joint covers with all required safing insulation and fire stopping at fire rated locations. Entire assembly shall be installed in strict accordance with the manufacturer's instructions and tested assemblies.

END OF SECTION

DIVISION 31 – EARTHWORK

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PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED

- A. Without limiting the generality thereof, the work under this Section includes the furnishing of all labor, equipment, supplies and materials and the performing of all operations in connection with but not necessarily limited to the following items:
1. Rock blasting and removal as required, for excavation to the lines and grades indicated on the Drawings. Note: Rock blasting will not be allowed for this project.
 2. Excavation and disposal of unsuitable or excess materials. Excavation of all traces of loam within the excavation and fill limits. Removal of all excess materials.
 3. Excavation, fill, and compaction as indicated or required for the grading of the new paved drives, walks and parking areas.
 4. Base and sub-base course material under pavements, slabs and footings, including compaction.
 5. Dewatering and control of water for all construction operations.
 6. Protection of existing buildings, pavements and utilities to remain.
 7. Dust and environmental controls.
 8. Trench and pit excavation, bedding, and backfill for all utilities, including compaction.
 9. Sheet piling, shoring and bracing of structural and trench excavations.
- B. Subsurface investigations have been executed and the results are included on the Drawings. These results are furnished for the Contractor's general information only. The Engineer assumes no responsibility for their completeness, accuracy or correctness.

1.2 JOB CONDITIONS

- A. Utilities:
1. The locations of known buried water lines, sewer lines, telephone cables, storm drains, culverts, gas mains, electric conduits, and other and other utilities are shown on the Drawings. No guarantee is made as to the correctness of the locations shown and to the completeness of the information given. The information shown is based upon a boundary survey done by BGM Engineers and Surveyors dated May 1, 2014. It is also based upon field observation and interviews with the Owner.
 2. Discontinue excavation by machinery when the excavation approaches pipes, conduits, or other underground structures of which the approximate locations are known. Use manual excavation methods to locate the obstructions.

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B. Existing Structures:

1. Perform excavation in such a manner that will prevent any possibility of undermining and disturbing the foundations of any existing structures and any work previously completed under this Contract.
2. Where existing buildings and other structures are in close proximity to the proposed construction, exercise extreme caution and utilize sheeting, bracing, and whatever other precautionary measures that may be required.

C. Repairing Damage:

Repair, or have repaired, all damage to existing utilities, structures, lawns, other public and private property which results from construction operations, at no additional expense to the Owner, to the complete satisfaction of the Engineer, the utility company and the property owner.

D. Do not leave any trenches open overnight.

E. Trench Bracing:

Properly support all trenches in strict accordance with all pertinent rules and regulations. Brace, sheet, and support trench walls in such a manner that they will be safe and that the ground alongside the excavation will not slide or settle, and that all existing improvements of every kind, whether on public or private property, will be fully protected from damage. In the event of damage to such improvements, immediately make all repairs and replacements necessary to the approval of the Engineer and at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 FILL MATERIAL

A. Approval Required:

All fill material shall be subject to the approval of the Engineer.

B. Notification:

For approval of fill material, notify the Engineer at least four working days in advance of intention to import material, designate the proposed borrow area, and permit the Engineer to sample as necessary from the borrow area for the purpose of making acceptance tests to prove the quality of the material.

2.2 ONSITE FILL MATERIAL

- A. In general, all on-site fill material shall be soil or soil-rock mixture that is free from organic matter and other deleterious substance. It shall contain no rocks or lumps over six inches in greatest dimension, and not more than 15% of the rocks or lumps shall be larger than 2 1/2 inches in greatest dimension. No on-site fill shall be placed without the approval of the Engineer.

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- B. The Contractor shall not have any right of property in any suitable materials taken from any excavation. Do not remove any such materials from the construction site without the approval of the Engineer. This provision shall in no way relieve the Contractor of his obligations to remove and dispose of any material determined by the Engineer to be unsuitable for backfilling.

2.3 BORROW AND BEDDING MATERIAL

A. Work Included:

Provide, place and compact borrow and bedding material in authorized excavation(s) below normal depth and in other location(s) as shown on the Drawings and/or as requested by the Engineer and/or as specified herein.

B. Gravel Borrow:

1. Well graded granular material suitable for placement in authorized excavations below the bottom of the bedding layer to replace deficient excavated material, for service road construction, and other designated uses.
2. Conform to requirements of ASTM D-1241-68, Type I, Gradation B or C.

C. Screened Gravel or Crushed Stone (Bedding Material):

1. Screened gravel or crushed stone shall be well graded in size from 1/4 inch to 3/4 inch.
2. Clean, hard, and durable particles or fragments.
3. Sieve Analysis:

Sieve Designation	%Passing by Weight Square Opening
1"	100
3/4"	90-100
3/8"	20-55
No.4	0-10
No.8	0-5

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D. Sand:

1. Clean, hard and durable particles or fragments.
2. Sieve Analysis:

Sieve Designation	%Passing by Weight Square Opening
3/8"	100
No.4	95-100
No.16	50-85
No.50	10-30
No.100	2-10

E. Common Borrow:

1. Common borrow shall consist of earth suitable for embankment construction. It shall be free from perishable rubbish, peat and other unsuitable material.
2. The moisture content shall be enough to provide the required compaction and stable embankment.
In no case shall the moisture content exceed 4 percent above optimum.
3. The optimum moisture content shall be determined in accordance with AASHTO T 180, Method C or D.

2.4 OTHER MATERIALS

- A. All other materials, not specifically described but required for a complete and proper installation, shall be provided as selected by the Contractor subject to the approval of the Engineer.
- B. Embankment Material:
Obtain prior approval and instructions from the Engineer prior to undertaking the excavation for pipe placement of any fill material that has been in an embankment less than one year.

2.5 UNSUITABLE MATERIAL

- A. If, in the opinion of the Engineer, the material encountered above the indicated grade shown on the Drawings for excavation is unsuitable material, remove the material to the widths and depths as directed by the Engineer. Replace this material as specified in the "Backfilling, Compaction, Control and Testing" Section of this Division.

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- B. If, in the opinion of the Engineer, the material encountered at or below the indicated grade shown on the Drawings for excavation is unsuitable material, remove the material to the full width of the trench and to a minimum depth of 12-inches below the pipe. Replace this material with thoroughly compacted, suitably screened gravel or crushed stone bedding material.
- C. All excavated materials designated by the Engineer as unsuitable shall become the property of the Contractor and disposed of at locations acceptable to or designated by the Owner, at no additional cost to the Owner.

PART 3 - EXECUTION

3.1 EXCAVATION- EARTH

A. General:

- 1. Unless otherwise specifically directed or permitted by the Engineer, begin excavation at the low end of sewer lines and proceed upgrade.
- 2. Perform excavation for sewers in a logical sequence.

B. Amount of Excavation:

1. Trench Width:

As shown on the Drawings or as specified for pipe installation.

2. Trench Depth:

As shown on the Drawings.

3. Open Excavation:

- a. The extent of open excavation shall be controlled by prevailing conditions.
- b. Open excavation shall, at all times, be confined to the limits prescribed by the Engineer.

4. Unauthorized Excavation:

- a. Backfill to the specified grade any excavation beyond the limits stated above and as shown on the Drawings (unless specifically ordered by the Engineer) with thoroughly compacted crushed stone or screened gravel.
- b. Backfilling unauthorized excavation shall be at no additional cost to the Owner.

C. Shoring and Bracing:

As the excavation progresses, install such shoring and bracing necessary to prevent caving and sliding and to meet the requirements of the State and OSHA safety standards.

3.2 EXCAVATION- LEDGE

A. Work Included:

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1. Excavation work in ledge includes the removal of ledge and rock required for the installation of pipes and/or structures.
2. "Ledge" and "rock" includes any natural compound, natural mixture, and chemical element in excess of two yards in volume and required to be excavated that, in the opinion of the Engineer, can be removed from its existing position and state only by blasting, drilling and blasting, wedging, drilling and wedging, wedging and breaking with power hand tools, or by extending the use of an approved excavating machine beyond normal and design wear and tear. No boulder, ledge, slab, or other single piece of excavated material less than one cubic yard in total volume shall be considered to be rock unless, in the opinion of the Engineer, it must be removed from its existing position by one of the methods mentioned above.
3. All trench excavation shall be classed as earth or ledge.

B. Related Work Specified Elsewhere (When Applicable):

1. The use of explosives is not allowed.
2. Traffic regulation, when applicable, is specified in Division 1.
3. When applicable, clearing, removal and replacement of paving, trench excavation, earth, backfilling, dewatering, borrow and bedding material, manholes and catch basins are specified in the appropriate Sections in this Division.
4. Pipe and pipe fittings, valves, gates and hydrants, when applicable, are specified in Divisions 2 and 15.

C. Existing Structures:

1. Perform excavation in such a manner that will prevent any possibility of undermining and disturbing the foundations of any existing structures and any work previously completed under this Contract.
2. Where existing buildings and other structures are in close proximity to the proposed construction, exercise extreme caution and utilize whatever precautionary measure that may be required.

D. Repairing Damage:

Repair, or have repaired, all damage to existing utilities, structures, lawns, and other public and private property which results from construction operation, at no additional expense to the Owner, to the complete satisfaction of the Engineer, the utility company, property owner, and the Owner.

E. Use of Explosives:

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The use of explosives on this project is prohibited. However, when the use of explosives is necessary for the prosecution of the Work, exercise the utmost care not to endanger life or property. The Contractor shall be responsible for any and all damage resulting from the use of explosives. Approval must be obtained from the Owner and other regulatory agencies prior to considering the use of explosives.

1. Store all explosives in a secure manner, in compliance with all State and local laws and ordinances, and legally mark all such storage places. Storage shall be limited to such quantity as may be needed for the work underway.
2. Designate as a BLASTING AREA all sites where electric blasting caps are located and where explosive charges are being placed. Mark all blasting areas with signs as required by law.
3. Place signs as required by law at each end of the blasting area and leave in place while the above conditions prevail. Immediately remove signs after blasting operations or the storage of caps is over.
4. Notify each property owner and public utility company having structures in proximity to the site of the work sufficiently in advance to enable the companies to take such steps as they may deem necessary to protect their property. Such notice shall not relieve the Contractor of any of his responsibility for damage resulting from his blasting operation.
5. Warn all persons within the danger zone of blasting operations and do not perform blasting work until the area is cleared. Provide sufficient flaggers outside the danger zone to stop all approaching traffic and pedestrians. Provide watch people during the loading period and until charges have been exploded. Place adequate protective covering over all charges before exploding.

3.3 BACKFILLING, COMPACTION, CONTROL AND TESTING**A. Work Included:**

Backfilling work includes backfilling trenches and/or excavation around structures with suitable material removed in the course of excavating and other suitable material.

B. Related Work Specified Elsewhere (When applicable):

1. Traffic regulations are specified in Division 1.
2. Clearing, removal and replacement of paving, when applicable, are specified in the appropriate Sections in this Division.

C. Quality Assurance:

1. Where backfill is required and/or where shown on the Drawings, compact fill to an in-place density not less than 95 percent of the maximum density of the material in accordance with ASTM D1556 Method "B", unless otherwise indicated on the Drawings or herein.
2. Determine in-place density in accordance with ASTM DI556 or by other methods as approved by the Engineer.

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3. Have density testing performed by an independent soils laboratory as approved by the Engineer, at no additional cost to the Owner.
4. Locations of tests (when applicable):
 - a. Average of one test between each manhole for interceptor sewers.
 - b. Average of two tests between each manhole for sewer laterals.
 - c. Average of one test on each side of each manhole in addition to b. above.

D. Performance:

1. General:

- a. Provide and place all necessary backfill material.
- b. Do not allow large masses of backfill material to be dropped into the excavation, as from a grab bucket, in such a manner that may endanger pipes and structures.
- c. Place material in a manner that will prevent stones and lumps from becoming nested.
- d. Completely fill all voids between stones with fine material.
- e. Do not place backfill on or against new concrete until it has attained sufficient strength to support loads without distortion, cracking, and other damage.
- f. Deposit backfill material evenly on all sides of structures to avoid unequal soil pressures.
- g. Place screened gravel, crushed rock, crushed stone, gravel borrow or sand in layers of uniform thickness not greater than 6 inches or as shown on the Drawings.
- h. Thoroughly compact each layer by means of a suitable vibrator or mechanical tamper.
- i. In excavations below normal depth or where unsuitable materials are excavated, gravel borrow may be used unless groundwater makes such usage impossible. If such is the case, then screened gravel or crushed stone shall be used.
- j. Do not backfill with, or on, frozen materials. Remove, or otherwise treat as necessary, previously placed material that has frozen prior to placing backfill.
- k. Do not mechanically or hand compact material that is, in the opinion of the Engineer, too wet. Do not continue backfilling **until** the previously placed and new materials have dried sufficiently to permit proper compaction.
- l. When original excavated material is unsuitable use only approved gravel borrow for backfilling.

2. Sheeting:

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- a. Leave sheeting in place when damage is likely to result from its withdrawal.
 - b. Completely fill with suitable material and thoroughly compact all voids left by the removal of sheeting.
3. Backfilling in Paved Areas:
- a. Backfill trenches in streets and other paved areas by moistening and compacting each layer to a minimum of 95% of the modified Proctor for the material.
 - b. Backfill in such a manner as to permit the rolling and compaction of the filled trench with the adjoining material to provide the required bearing value for paving immediately after backfilling is completed.
 - c. Where required, place excavated material that is acceptable to the Engineer for surfacing or pavement sub-base, at the top of the backfill to the depths as directed by the Engineer. Bring the surface to the required grade and rake out and remove stones.
4. Backfilling Trenches in Non-paved Areas:
- a. Grade the ground to a reasonable uniformity.
 - b. Leave the mounding of 1" per 1' of trench depth over the trenches in a uniform and neat condition, satisfactory to the Engineer.
5. Bedding & Backfilling Pipelines:
- a. Install pipe bedding and cushion and primary backfill in accordance with 1 (g) above.
 - b. Deposit and thoroughly compact the remainder of the backfill in 12 inch layers.
6. Placing and Compacting Backfill:
- c. Water Jetting:
 - i. Backfill by water jetting shall not be used.
 - d. Puddling:
 - i. Backfill puddling shall not be used.
 - e. Tamping:
 - i. Deposit and spread the backfill material in uniform parallel layers not exceeding 6 inches thick.
 - ii. Tamp each layer as required to obtain a thoroughly compacted mass.
 - iii. If necessary, furnish and use in adequate number of power driven tampers, each weighing at least 20 lbs.

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f. Rolling:

i. Compact material by rolling only when the width and depth of the excavation are sufficient to accommodate the rollers, dozers, mechanical tampers, or other similar powered equipment, as may prove to be acceptable, and when it can be performed without causing damage to pipes installed in the excavation.

ii. Deposit and spread the backfill material in uniform parallel layers not exceeding 8 inches thick.

iii. Roll each layer as required to obtain a thoroughly compacted mass.

g. Other placing and compacting methods may be employed only when approved by the Engineer.

7. Improper Backfill:

h. When excavation and trenches have been improperly backfilled, and when settlement occurs, reopen the excavation to the depth required, as directed by the Engineer.

i. Refill and compact the excavation or trench with suitable material and restore the surface to the required grade and condition.

j. Excavation, backfilling, compacting work and testing performed to correct improper backfilling shall be performed at no additional cost to the Owner.

END OF SECTION

SECTION 312270 – EROSION CONTROL
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PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Temporary erosion control measures
- B. Coordination of temporary and permanent erosion control measures

1.2 REFERENCES

- A. FHWA FP-14 Standard Specifications for Construction of Roads and Bridges, on Federal Highway Projects, 2014 edition.

1.3 SUBMITTALS

- A. Erosion Control Plan:
Submit prior to commencing affected work a schedule based on Project conditions showing proposed methods, sequencing, and coordination of temporary and permanent erosion control measures.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Stone Check Dams:
Composed of stone 3/4 - 1 inch in diameter free of organic material, debris, waste and conform to ASTM C33; stone size No. 67.
- B. Sandbags:
Heavy cloth bags of approximately one cubic foot capacity filled with sand or gravel.
- C. Matting:
Composed of straw, twisted craft paper, jute yam, wood excelsior, glass fiber, or plastic film.
- D. Mulch:
Mats, netting, straw or hay, bark chips, wood fiber, or other acceptable material. Do not use musty, moldy, caked, or otherwise low quality material.
- E. Temporary Grass:
Suitable quick-growing species providing a temporary cover which will not compete with permanent grass sown later.
- F. Silt Fence:
 - 1. Propex Silt-Stop, Mirafi 100X, or approved equal.
 - 2. Supports shall be in accordance with the manufacturer's recommendations, or as required for adequate performance.

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G. Erosion Control Blankets:

1. Erosion Control Blankets used in swales shall be made of 100% straw with associated netting and/or thread.
2. Erosion Control Blankets used on level spreaders shall be jute or excelsior matting.

H. Temporary Drains:

1. Flexible drains shall consist of collapsible neoprene pipe, minimum 3 inches in diameter or approved equal.
2. Drains under traffic areas shall consist of corrugated metal of a gauge consistent with the loading conditions.

PART 3 EXECUTION

3.1 GENERAL

- A. Do not start work until Erosion Control Plan has been approved.
- B. Conduct all operations in a manner and sequence that minimizes disturbance of existing protective vegetation.
- C. Install permanent erosion control features at the earliest practical time. Use temporary erosion controls:
 1. To control erosion when it is not practical to install permanent erosion control features.
 2. To control temporary erosion not associated with permanent erosion control.
 3. To correct unsatisfactory conditions that develop during construction.
- D. Maintain and supplement as necessary all erosion control features and devices required to effectively prevent migration of sediment from the work area throughout the life of the Contract.

3.2 INSTALLATION OF TEMPORARY EROSION CONTROLS

- A. Temporary Grass:

Install in accordance with Section 02930 where shown on the Plans or as required to stabilize disturbed slopes. Seed all slopes before they reach 30 feet in slope length.
- B. Sediment Check Dams:

Install check dams in ditches, swales, along the toe of embankments, and at other locations required to effectively control erosion.
- C. Slope Drains:

Construct temporary slope drains where shown on the Plans or where necessary to control erosion. Protect outlets with riprap.

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D. Silt Fence:

Install where shown on the Plans and at other locations as necessary to control erosion. Support in accordance with manufacturer's recommendations.

E. Mulch:

Install immediately after each area has been properly prepared. When seed for erosion control is sown prior to placing the mulch, the mulch shall be placed 48 hours after seeding.

F. Erosion Control Blankets:

Install along the bed of swales or level spreaders when called for on the Plans.

1. Swales shall be prepared and seeded in accordance with Section 02930 prior to installation of erosion control blankets. Install blankets starting at the upstream end unrolling downstream.
2. Level Spreaders: Place two strips of jute or excelsior matting along the lip of each level spreader.
3. Blankets should not be stretched but allowed to lay loosely on the soil surface to achieve maximum soil contact. Overlap and secure the blankets to the ground in accordance with the manufacturer's recommendations.

END OF SECTION

DIVISION 32 – EXTERIOR IMPROVEMENTS

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SECTION 322510-BITUMINOUS PAVEMENT
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PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Placing and compacting base courses
- B. Temporary pavement patching
- C. Permanent roadway paving and patching

1.2 REFERENCED SECTIONS

- A. Section 312110 - Clearing and Grubbing
- B. Section 312200 - Earthwork

1.3 REFERENCES

- A. FHWA FP-14 Standard Specifications for Construction of Roads and Bridges Projects, 2014 Edition.

1.4 SUBMITTALS

- A. Submit test reports of proposed aggregate sources prior to incorporating such materials into the Project.
- B. Submit Certificates of Compliance for all pavement mixtures furnished under this Section.

1.5 QUALITY ASSURANCE

- A. The CONTRACTOR shall perform tests to qualify each source of materials and at sufficient intervals to assure conformance of all materials furnished for use under this Section.
- B. The "Materials and Research Engineer" or the "Engineer" shall refer to the CONTRACTOR's person responsible for Quality Control of hot mix pavements.
- C. Verification testing of material may be performed by an independent testing laboratory paid for by the OWNER.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Base Courses:
 - 1. 4" asphaltic concrete Type II Binder Section 322505
- B. Bituminous Pavement:
 - 1. 2" asphaltic concrete Type I Surface, with anti-strip additive designed for 5,000,000 ESAL.

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2.2 SOURCE QUALITY CONTROL

- A. Test each proposed source of aggregates for gradation and moisture-density relationship.
- B. Verification testing of materials at the asphalt plant may be performed by the OWNER to ensure conformance with the requirements for materials furnished under this Section.

PART 3 EXECUTION

3.1 PREPARATION

- A. Prepare site in accordance with Section 312110.
- B. Backfill excavations in accordance with Section 332200.
- C. The subgrade shall be prepared in accordance with Section 312200.
- D. RECLAMATION OF PAVEMENT:

Where bituminous pavement is to be reclaimed, process the material and stock-pile for reuse.

- E. Exercise care in the removal of pavement so that no pavement is unnecessarily disturbed or destroyed.
- F. Mechanically cut pavement shall be removed to a straight line unless otherwise directed by the ENGINEER.
- G. Diamond saws shall be used for sawing bituminous concrete pavement. Cutting-type grader blades will not be allowed.

3.2 PROTECTION

- A. Curbs, walks, and walls are to be adequately protected and left in a clean condition.

3.3 BASE COURSES

- A. Install subbase and base courses in accordance with Construction drawings.
- B. The finished base course surface shall not vary more than 1/4 inch from a 10-foot straightedge applied parallel or perpendicular to the centerline.

3.4 TEMPORARY PATCHING

- A. Temporary pavement repairs shall be made before subjecting excavations to traffic and shall be maintained until permanent pavement repairs are made.
- B. Subbase and base courses and materials shall conform to the requirements for permanent pavement repairs.

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- C. Temporary pavement shall consist of a single 2-inch binder course unless otherwise shown on the Plans.

3.5 PERMANENT PATCHING

- A. Cut back existing pavement from the edge of excavations to form a sharp, clean, straight edge on undisturbed material.
- B. Apply tack coat to saw cut edges and other surfaces where bond to new pavement is required.
- C. Install permanent pavement as specified below.
- D. Any additional paving required by trenches wider than the limits specified in the Plan will be performed at no additional cost to the OWNER.

3.6 PERMANENT PAVEMENT

- A. Install permanent pavement in accordance with construction drawings.
- B. Adjust manhole covers, catch basin grates, valve and meter boxes and the like to not less than 1/8 inch and not more than 1/2 inch below final pavement grade.
- C. Apply tack coat to saw cut edges and other surfaces where bond to new pavement is required.
- D. Full width permanent pavement shall consist of the lift thicknesses and types shown on the Plans.
- E. Shim low, uneven, or settled areas with leveling mix before application of wearing course.

3.7 REPAIR OF SETTLED SURFACES

- A. Should an area settle that the CONTRACTOR has permanently paved:
 - 1. Saw cut and remove the affected pavement.
 - 2. Remove base materials if necessary to ensure proper compaction of subgrade, subbase, and base.
 - 3. Repair as specified for permanent patching.

3.8 FIELD QUALITY CONTROL

- A. Verification testing of installed materials may be performed to ensure conformance with the requirements for materials, compaction, and surface tolerance of this Section.

END OF SECTION

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PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Fence framework, fabric, and accessories
 - 1. Pedestrian and vehicle gates
 - 2. Concrete
 - 3. Electrical grounding

1.2 CONTRACTOR PERFORMED WORK

- A. Layout fence lines, gates, and terminal posts with suitable stakes (at intervals not exceeding 500 feet or line of sight).
- B. Layout USC&G benchmarks, property monuments, and other underground structures with suitable stakes.
- C. Obtain excavation/soil disturbance permit for Subcontractor.
- D. Furnish signs for Subcontractor to install on fence. See Part 3.

1.3 ACTION SUBMITTALS

- A. Submit the following:
 - 1. Catalog data on fabric, posts, accessories, fittings, and hardware.
 - 2. Two legible copies of batch tickets for each load of concrete to the Owner's Representative.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle structural steel without damaging finish.
- B. Deliver manufactured materials in original unopened packages, containers, or bundles with manufacturer's label intact and legible.
- C. Store materials off ground, under cover, and away from damp surfaces.
- D. Remove damaged unlabeled or unsatisfactory materials that do not meet this specification from the job site.

1.5 QUALITY ASSURANCE

- A. Comply with the following unless otherwise noted.

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Federal Specification RR-F (http://www.dtic.mil/dtic/search/tr/)	
191K	General Specification
191/1D	Fabric
191/2D	Gates
191/3D	Posts, Rails and Braces
191/4D	Accessories

ASTM International	
ASTM F-552	Definition of Terms
ASTM F-567	Installation
ASTM F-626	Fence Fittings
ASTM F-669	Strength Requirements
ASTM F-900	Gate Construction
ASTM F-1083	Steel Pipe for Fence
ASTM F-1910	Long Barbed Tape

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PART 2 PRODUCTS

3.1 MATERIALS

- A. Fabric: ASTM A392, Class 1, zinc coated (1.2 ounces), steel wire/fabric, 2-inch mesh size on a side, 9 American Wire Gauge (AWG) (0.148 inches) coated wire size, galvanized before weaving, with twisted barbed selvages top and bottom.
- B. Posts, Rails & Braces: ASTM F1083 galvanized steel pipe.
- C. Galvanizing: ASTM A123, unless otherwise indicated, provide hot-dipped, zinc-coated accessories of ferrous material with weight of zinc coating not less than 1.2 ounces per square foot.
- D. Barbed Wire: ASTM A121 metallic coated steel, Type Z zinc coating strand wire, 12-1/2 AWG (0.099 inches) steel wire, 4 barb points, 14 AWG (0.080 inches) spaced on 5-inch centers.
- E. Barbed tape: 430 stainless steel, 0.025 inches thick by minimum 1-inch wide prior to forming, 18-inch diameter single helical coil, die stamped to produce a cluster of 4 barbed points at maximum 4 inches on center, cold rolled around a galvanized steel core wire. Aluminum ties not acceptable.
- F. Fence Fittings: ASTM F626, Standard Specification for Fence Fittings, type and components as noted.

2.6 BASIC FENCE SYSTEM COMPONENTS

- A. Terminal Posts (angles, corners, ends, and pull posts): 2-1/2-inch Schedule 40 for fence height up to 8 feet and 3 inch Schedule 40 for fence height over 8 feet and equal to or under 16 feet.
- B. Line Posts: 2-inch Schedule 40 for fabric height up to 8 feet, 2-1/2-inch Schedule 40 for fabric height over 8 feet and equal to or under 16 feet.
- C. Braces at Terminal or Gateposts: 1-1/4-inch Schedule 40.
- D. Tension Rods: 3/8-inch diameter galvanized steel with turnbuckle end-fitting-type tighteners.
- E. Tension Wire: 7- AWG coil spring, hard tempered carbon steel wire.
- F. Tension Bars: 3/4 x 3/16-inch-thick galvanized steel. Minimum length shall be 2 inches less than the full fabric height.
- G. Tension Bands: Minimum 3/4 x 0.074 inch () galvanized steel offset bands.
- H. Brace Bands: Minimum 3/4 x 0.105 inch () thick galvanized steel.
- I. Brace Ends: Cupped fittings of formed steel or cast iron with ears for attaching horizontal braces to brace bands and for connecting diagonal tension rods.

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- J. Wire Ties: Galvanized, steel 9 AWG with a diameter of 0.148 inches.
- K. Post Caps: Formed steel, malleable cast iron, or aluminum, sized to post diameter, with set screw retainer.
- L. Hog Rings: Minimum 12 AWG galvanized steel
- M. Barbed Wire Extension Arms: Galvanized pressed steel, type as specified.
- N. Gate Posts:
 - 1. Gate leaf-widths up to 6 feet: 2-1/2-inch Schedule 40.
 - 2. Gate leaf-widths up to 12 feet: 3-1/2-inch Schedule 40.
 - 3. Gate leaf-widths up to 18 feet: 6-inch Schedule 40.
 - 4. Gate leaf-widths up to 23 feet: 8-inch Schedule 40.
- O. Gate Frames:
 - 1. Gate leaf-widths less than 10 feet: 1-1/2-inch Schedule 40.
 - 2. Gate leaf-widths 10 feet to 16 feet: 2-inch Schedule 40.
 - 3. Gate leaf-widths greater than 16 feet: 2-inch Schedule 80.
 - 4. Diagonal tension rods for leaf-widths over 6 feet.
 - 5. For gate leaves greater than 8 feet in any direction, provide intermediate braces placed symmetrically so that frame members, including bracing, are spaced not further than 8 feet. Provide braces same size as those called out for fence.
- P. Provide non-lift-off type gate hinges sized for gate of adequate strength with large rearing surface for clamping in position so that hinges do not easily twist or turn with gate action.

2.7 FENCE GROUNDING

- A. Grounding Cable: No. 4/0 AWG bare, stranded, soft temper copper cable conforming to ASTM B8, Standard Specification for Concentric-Lay stranded Copper Conductors.
- B. Flexible Braid: Tinned copper braid with tinned copper ferrules; minimum 250 ampere rating; 12-inch-minimum length. O-Z/Gedney Type FB.
- C. Cable to Pipe Clamps: NRTL (National Recognized Testing Laboratory) listed copper alloy connectors with silicon bronze hardware for making cable to pipe connections. O-Z/Gedney Type ABG 1-1/2 inch and smaller, Type CG 2 inch and larger pipe diameter.

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- D. Flexible Braid to Pipe Clamps: NRTL listed copper alloy connectors with silicon bronze hardware for making braid or copper bar to pipe connections. O-Z/Gedney Type RG.

2.8 CONCRETE

- A. Concrete: Furnish concrete for posts and braces in accordance with Section 033046, *Cast-In-Place Concrete*.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Notify Owner's Representative 15 working days prior to start of construction to identify known utilities and stake and flag locations.
- B. Before installing chain-line fence, perform site clearing and grading as noted on Drawings.
- C. Allow footing to cure minimum 7 days before installing fabric and other materials.

3.9 GENERAL REQUIREMENTS

- A. Coat damaged galvanized finish with zinc-enriched paint.
- B. Leave area of installation neat and free of debris caused by erection of fence.
- C. Posts, bracing, and other structural members shall be located on the inside of the security fence.
- D. Gate hardware installed in PA or higher security area that if removed would facilitate unauthorized entry must be installed in a manner to mitigate tampering and/or removal (e.g., by brazing, peening, or welding). Consult with LANL Physical Security.

3.10 LATCHES

- A. Single gates less than 10 feet wide may use forked type latches.
- B. Provide single gates, 10 feet, or more, wide, and inactive leaves of double gates with positive latching devices at top, bottom and center of closing edges such as fork type latches with full gate height plunger bar or rod.
- C. At double gates, provide locking devices that retain both gate leaves in same plane when closed.
- D. Arrange plunger bars and rods so that they engage gate stops and cannot be raised when locked.
- E. Rigidly weld brackets for plunger bars holders to inactivate leaves.
- F. Arrange latching mechanisms at double gates so one padlock can lock both gate leaves at center latch integral to gate.

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- G. Install keepers consisting of a mechanical device for securing free end of gate when in full open position.

3.11 POSTS

- A. Space line posts equidistant at intervals not exceeding 10 feet. Measure interval parallel to grade of proposed fence and in line of fence from center to center of post.
- B. Set terminal posts (end, corner, and gate) at beginning and end of each continuous length of fence and at abrupt changes in vertical and horizontal alignments.
- C. Set fence and gate posts in concrete in holes of diameter and depth as follows:
 - 1. Minimum Diameter: Four times outside diameter of post up to four inches and three times for larger outside diameters.
 - 2. Minimum Depth: 36 inches plus an additional 3 inches for each 1-foot increase in fence height over 4 feet.
- D. Post shall be centered in the concrete base within a +/- one-inch tolerance.
- E. Set fence posts in a vertical position, plumb within a one-half inch tolerance over height of fence in two planes, and in line. Backfill concrete into excavation and extend 2 inches above grade. An alternative method is to stop footing 4 inches below grade to allow for cover with sod, black top, or concrete slab. In either case, crown concrete at top to shed water and slope 2 inches away from post to ground with tolerance of +0 to -1 inch. Crown shall have a troweled finish and be free from surface contours that trap water.
- F. When solid rock or concrete is encountered, without an overburden of soil, set posts in solid rock or concrete. Depth of hole shall be twelve times the largest cross section of posts. Diameter of hole shall be 6 inch greater than largest cross section of post.
- G. The use of sleeves in order to leave voids in new concrete construction is recommended.
- H. Half-fill the void with non-shrinkable hydraulic cement and force post to bottom of hole and plumb. Thoroughly work additional grout into hole so as to leave no voids. Crown grout to shed water.
- I. Provide tension offset bands fitted around terminal posts at maximum 15-inch intervals to attach tension bars to posts.
- J. Provide brace center band to secure brace ends and tension rods to post.
- K. Install post caps on all pipe post terminals: end, corner, and gate and all line posts that do not have barbed-wire extension arms.

3.12 FABRIC

SECTION 323113 – CHAIN LINK FENCE AND GATES

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- A. Place chain-link fabric on outside of the area enclosed. Posts, bracing, and other structural members shall be located on the inside of the fence.
- B. Place fabric by securing one end, applying sufficient tension to remove slack before making attachment elsewhere. Tighten fabric to provide smooth uniform appearance free from sag.
- C. Cut fabric by untwisting a picket and attach each span independently at terminal posts. Use stretcher bars with tension bands at maximum 15-inch intervals.
- D. Join rolls of wire fabric by weaving a single picket into ends of rolls to form continuous mesh.
- E. Provide continuous length tension bars equal to fence height and located wherever chain link fabric end attaches to terminal post. Thread bars through fabric ends for full height and attach to posts by tension bands.
- F. Install fence fabric 2 inches maximum above ground level. Ground level shall be defined as compacted ground or earth material or base course below the fence fabric. Compacted material shall extend three feet on each side of fence and along same contour as fence within +/-6 inches.
- G. Fasten fence fabric with wire ties to top and bottom of line posts and at intervals not exceeding 15 inches. The final process of tightening the tie wire shall draw the fabric tightly to the post and top rail. Wire ties shall wrap a full 360 degrees around the post and engage a full diamond of the fence fabric. The two ends of the tie shall be twisted securely with three full twists, power twisting is subcontractor option. Ends shall be cut off to prevent untwisting by hand. Care shall be taken to assure ends of ties do not protrude beyond the vertical plane of the fabric.

3.13 BARBED WIRE

- A. Fencing: Top fencing with [3] strands of barbed wire on each extension arm. Provide [vertical extension arm outriggers] [single 45-degree extension arm] [double 45-degree extension arm]. Angle single extension arm away from security area or as directed by LANL Physical Security.
- B. Pull taut to remove sag, firmly install barbed wire in slots of extension arms, and secure to post or terminal arm.
- C. Gate: Install barbed wire strands at 6 inches on center between extended gate frame members above gate fabric.

3.14 BARBED TAPE

- A. Top fencing with barbed tape at loop spacing of 9 inches.
- B. Fencing: Provide 45-degree double extension arm with 2 strands of barbed wire in each extension arm. Pull wire taut to remove sag, and firmly install barbed wire in most inner and outer slot of extension arm. Attach barbed tape to barbed wire with hog rings.

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- C. Gate: Provide one strand of barbed wire to top of extended gate frame and pull taut to remove sag. Secure barbed tape to barbed wire and top selvage of gate fabric with hog rings at each loop. Barbed tape loop spacing same as fence.

3.15 GATES

- A. Install gates true to opening and plumb in closed position within a vertical tolerance of one-half inch.
- B. Hang gates so that bottom of gate is as close to ground as practical (2 inches max.) while allowing sufficient clearance for free operation through at least 90 degree in one direction from closed position.
- C. Fasten gate fabric to vertical (end) gate frame members using tension bars and bands as for fence fabric. Fasten fabric to top and bottom gate frame members and to intermediate braces with 11 AWG wire ties or clips at minimum spacing of 14 inches on center.
- D. Extend end frame members 18 inches vertically above top member of gate frame to support barbed wire.
- E. Provide tension rods as diagonal braces on gates and secure rods at gate corner only.
- F. Gates installed in PA or higher security area, gate hardware shall be installed in a manner to mitigate tampering and/or removal, e.g., by brazing, peening or welding to prevent removal with hand tools. Hinges shall be tamper proof and installed to prevent the gate from being lifted off.

3.16 TENSION WIRE AND RAIL

- A. Provide [top] and] bottom tension wire and stretch wire from end to end of each stretch of fence at height that will enable it to be fastened to the fabric.
- B. Stretch tension wire taut (not to exceed 6 inches sideway deflection) between terminal posts, securely fasten the tension wire to the terminal posts. Tension wire shall be within 2 inches of [top and] bottom of the fence fabric and secured to fabric with hog rings at 24 inches on center, secure with wire ties to every third line post minimum.
- C. Provide top rail and support at each post so that a continuous brace from end to end of each stretch of fence is formed. Fasten fabric to the top rail at intervals not exceeding 24 inches. Securely fasten top rail to terminal posts and join with sleeves or coupling to allow for expansion and contraction. The rail sleeve must be fabricated to prevent movement along the rail.

3.17 ELECTRICAL GROUNDING

- A. Bond gateposts on both sides of gate openings using direct buried grounding cable and cable to pipe clamps. Bond gateposts to gates using flexible braid and flexible braid to pipe clamps. Ground posts on both ends of gates; steel posts set in concrete will be considered as adequately grounded.

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- B. Ground permanent metallic fences crossed by overhead power at every third post for a distance of 50 feet from the crossing; chain link fences with steel post set in concrete will be considered as adequately grounded.
- C. Ground metal fences surrounding substations and switching stations to station ground system in accordance with the National Electrical Safety Codes and IEEE Std. 80.

3.18 EXCAVATION, BACKFILL, AND COMPACTION

- A. Refer to Section 31 2000, *Earth Moving*.

3.19 SIGN INSTALLATION (GFE)

- A. Install government furnished property signs or no trespassing signs in areas as indicated by the Owners Representative.
- B. Signs will generally be 24" x 24" or smaller and shall be attached to the wire fabric by the use of, as specified, hog rings.
- C. General sign locations will be located on all gates, 25 feet each side of gates, and at visible distances along the fence line, not to exceed 300 feet.

END OF SECTION

SECTION 323119 – IMPASSE II®- HIGH SECURITY STEEL FENCE SYSTEM, ORNAMENTAL PALE

GOVERNMENT OF THE VIRGIN ISLANDS, VIRGIN ISLAND NATIONAL GUARD REMOVE AND REPLACE SOUTHERN PERIMETER FENCE 6304 ESTATE NAZARETH, ST. THOMAS, UNITED STATES VIRGIN ISLANDS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. The contractor shall provide all labor, materials and appurtenances necessary for installation of the steel corrugated pale security fence system defined herein.

1.2 RELATED WORK

- A. Section 312200 - Earthwork
- B. Section 03346 - Concrete

1.3 SYSTEM DESCRIPTION

- A. The manufacturer shall supply a total steel ornamental pale high security fence system of the Ameristar® (specify Impasse II® or Impasse II Anti-Scale) model, (specify Trident™, Stronghold™ or Gauntlet™) design. The system shall include all components (i.e., pales, rails, posts, gates and hardware) required.

1.4 QUALITY ASSURANCE

- A. The contractor shall provide laborers and supervisors who are thoroughly familiar with the type of construction involved and materials and techniques specified.

1.5 REFERENCES

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- B. ASTM B117 - Practice for Operating Salt-Spray (Fog) Apparatus.
- C. ASTM D523 - Test Method for Specular Gloss.
- D. ASTM D714 - Test Method for Evaluating Degree of Blistering in Paint.
- E. ASTM D1654 - Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
- F. ASTM D2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
- G. ASTM D2794 - Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
- H. ASTM D3359 - Test Method for Measuring Adhesion by Tape Test.
- I. ASTM F2408 – Ornamental Fences Employing Galvanized Steel Tubular Pickets.

SECTION 323119 – IMPASSE II®- HIGH SECURITY STEEL FENCE SYSTEM, ORNAMENTAL PALE

GOVERNMENT OF THE VIRGIN ISLANDS, VIRGIN ISLAND NATIONAL GUARD REMOVE AND REPLACE SOUTHERN PERIMETER FENCE 6304 ESTATE NAZARETH, ST. THOMAS, UNITED STATES VIRGIN ISLANDS

1.6 SUBMITTAL

- A. The manufacturer's submittal package shall be provided prior to installation.

1.7 PRODUCT HANDLING AND STORAGE

- A. Upon receipt at the job site, all materials shall be checked to ensure that no damage occurred during shipping or handling. Materials shall be stored in such a manner to ensure proper ventilation and drainage, and to protect against damage, weather, vandalism and theft.

1.8 PRODUCT WARRANTY

- A. All structural fence components (i.e. rails, pales, and posts) shall be warranted within specified limitations, by the manufacturer for a period of 15 years from date of original purchase. Warranty shall cover any defects in material finish, including cracking, peeling, chipping, blistering or corroding.

PART 2 - MATERIALS

2.1 MANUFACTURER

- A. The steel ornamental pale high security fence system shall conform to Ameristar (specify Impasse II or Impasse II Anti-Scale) model, (specify Trident, Stronghold or Gauntlet) (specify 2-Rail or 3-Rail) style manufactured by Ameristar Perimeter Security Inc., in Tulsa, Oklahoma.

2.2 MATERIAL

- A. Steel material for fence framework (i.e., corrugated pales, rails and posts), when galvanized prior to forming, shall conform to the requirements of ASTM A924/A924M, with a minimum yield strength of 45,000 psi (310 MPa). The steel shall be hot-dip galvanized to meet the requirements of ASTM A653/A653M with a minimum zinc coating weight of 0.90 oz/ft² (276 g/m²), Coating Designation G-90.
- B. Material for corrugated pales shall be a nominal 2.75" x .75" x 14 Ga. The cross-sectional shape of the rails shall conform to the manufacturer's Impasse II® rail design a nominal 2" x 2" x 11 Ga. Pre-drilled holes in the Impasse II® rail shall be spaced 6" on center, providing a pale airspace of no greater than 3.25" or Pre-drilled holes in the Impasse II Anti-Scale rail shall be spaced 4.1875" on center, providing a pale airspace of no greater than 1.5" (38mm). Tamperproof fasteners shall be used to fasten each pale to rail at every intersection. Fence posts and gate posts shall meet the minimum size requirements of Table 1.
- C. If applicable - Material for steel Impasse II privacy screening shall be 18ga. preformed slats, providing complete screening coverage between pales and at pale to post connections. Impasse II privacy screening shall provide screening from top rail to bottom rail, and be capable of traversing terrain without impeding the raking capabilities of the fencing panel. Privacy screening not available for Impasse II Anti-Scale model.

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2.3 FABRICATION

- A. Pales, rails and posts shall be pre-cut to specified lengths. Impasse II rails shall be pre-punched to accept tamperproof security fasteners. Post flange shall be pre-punched to accept rail to post attachment. Post web shall be punched providing a clear opening for interior of rails to align throughout the entire system for affixing conduit, video cabling, IDS wiring, and other components for a complete systems integration. Impasse II rails shall be attached to post flange providing a bracket-less design at each intermediate post.
- B. The manufactured galvanized framework shall be subjected to the PermaCoat® thermal stratification coating process (high-temperature, in-line, multi-stage, multi-layer) including, as a minimum, a six-stage pretreatment/wash, an electrostatic spray application of an epoxy base, and a separate electrostatic spray application of a polyester finish. The base coat shall be a thermosetting epoxy powder coating (gray in color) with a minimum thickness of 2 mils (0.0508mm). The topcoat shall be a “no-mar” TGIC polyester powder coat finish with a minimum thickness of 2 mils (0.0508mm). The color shall be (specify Black, Bronze, White, or Desert Sand). The stratification-coated framework shall be capable of meeting the performance requirements for each quality characteristic shown in Table 2.
- D. Completed panels shall be capable of supporting a 400 lb. load (applied at midspan) without permanent deformation. Panels shall be biasable to a 30° change in grade.
- C. Impasse II fence system shall be designed to minimize the system impedance to comply with IEEE grounding requirements. No additional grounding material, beyond the structure grounding lug installation, will be required to create a safe low resistance fence system. By way of fence construction, the entire fence system is inherently grounded without the need for any additional work. Grounding location at the post is for taking the fence system to site ground.
- D. Swing gates shall be fabricated using 2” sq. x 12ga rail, 2” sq. x 12ga. gate ends, and 2.75” x .75” x 0.075 pales. Gates that exceed 6’ in width will have a 2” sq. x 11ga. intermediate upright. All rail and upright intersections shall be joined by welding. All pale and rail intersections shall also be joined by welding.
- E. Sliding cantilever gates shall be TransPort IS design matching style, height, and color of fence system. The dual enclosed track slide gate shall be an aluminum component design using tracks, uprights, pales, hardware, fittings, and fasteners. Gate installation shall comply with latest ASTM F2200 standards for automated gates, regardless if the gate is of manual operation.
- F. Pedestrian swing gates shall be self-closing, having a gate leaf no larger than 48” width. Integrated hinge-closer set (2 qty) shall be ADA compliant that shall include a variable speed and final snap adjustment with compact design (no greater than 5” x 6” footprint). Hinge-closer set (2 qty) shall be tested to a minimum of 500,000 cycles and capable of self-closing gates up to a maximum gate weight of 260 lbs. and maximum weight load capacity of 1,500 lbs. Hinge-closer device shall be externally mounted with tamper-resistant security fasteners, with full range of adjustability, horizontal (.5” - 1.375”) and vertical (0 - .5”). Maintenance free hinge-closer set shall be tested to operate in temperatures of negative 20 F to 200 F degrees, and swings to negative 2 degrees to ensure reliable final lock engagement.

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PART 3 - EXECUTION

3.1 PREPARATION

- A. All new installation shall be laid out by the contractor in accordance with the construction plans.

3.2 FENCE INSTALLATION

- A. Fence post shall be spaced according to Table 3, plus or minus ¼". For installations that must be raked to follow sloping grades, the post spacing dimension must be measured along the grade. Fence panels shall be attached to the line and end posts with fasteners supplied by the manufacturer. Attachment to corner post shall be made using brackets and fasteners supplied by the manufacturer (See Figure 1). Posts shall be set in concrete footers having a minimum depth of 36" (Note: In some cases, local restrictions of freezing weather conditions may require a greater depth). The "Earthwork" and "Concrete" sections of this specification shall govern material requirements for the concrete footer. Posts setting by other methods such as plated posts or grouted core-drilled footers are permissible only if shown by engineering analysis to be sufficient in strength for the intended application.

3.3 FENCE INSTALLATION MAINTENANCE

- A. When cutting/drilling rails or posts adhere to the following steps to seal the exposed steel surfaces:
 - 1. Remove all metal shavings from cut area.
 - 2. Apply zinc-rich primer to thoroughly cover cut edge and/or drilled hole; let dry.
 - 3. Apply 2 coats of custom finish paint matching fence color. Failure to seal exposed surfaces per steps 1-3 above will negate warranty. Ameristar spray cans or paint pens shall be used to prime and finish exposed surfaces; it is recommended that paint pens be used to prevent overspray. Use of non-Ameristar parts or components will negate the manufactures' warranty.

3.4 GATE INSTALLATION

- A. Gate posts shall be spaced according to the manufacturers' gate drawings, dependent on standard out-to-out gate leaf dimensions and gate hardware selected. Type and quantity of gate hinges shall be based on the application; weight, height, and number of gate cycles. The manufacturers' gate drawings shall identify the necessary gate hardware required for the application. Gate hardware shall be provided by the manufacture of the gate and shall be installed per manufacturer's recommendations.

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3.5 CLEANING

- A. The contractor shall clean the jobsite of excess materials; post-hole excavations shall be scattered uniformly away from posts.

Table 1 – Minimum Sizes for Impasse II® Posts

Table 1 – Minimum Sizes for Impasse II® Posts				
<u>Fence Posts (Nominal)</u>		<u>Panel Height</u>		
3” x 2.75” x 12 Ga. I-Beam		Up to & Including 8’ Height		
4” x 2.75” x 11 Ga. I-Beam		Over 8’ Height up to & including 10’ Height		
<u>Gate Leaf</u>	<u>Gate Height</u>			
	<u>Up to & Including 6’</u>	<u>Over 6’ Up to & Including 8’</u>	<u>Over 8’ Up to & Including 10’</u>	<u>Over 12’</u>
Up to 4’	3” x 12Ga.	3” x 12 Ga.	4” x 11 Ga.	4” x 11 Ga.
4’1” to 6’	3” x 12Ga.	3” x 12 Ga.	4” x 11 Ga.	4” x 11 Ga.
6’1” to 8’	4” x 11 Ga.	6” x 3/16”	6” x 3/16”	6” x 3/16”
8’1” to 10’	4” x 11 Ga.	6” x 3/16”	6” x 3/16”	6” x 3/16”
10’1” to 12’	6” x 3/16”	6” x 3/16”	6” x 3/16”	8” x 1/4"
12’1” to 16’	6” x 3/16”	6” x 3/16”	8” x 1/4”	8” x 1/4"

Table 2 – Coating Performance Requirements

<u>Quality Characteristics</u>	<u>ASTM Test Method</u>	<u>Performance Requirements</u>
Adhesion	D3359 – Method B	Adhesion (Retention of Coating) over 90% of test area (Tape and knife test).
Corrosion Resistance	B117, D714 & D1654	Corrosion Resistance over 3,500 hours (Scribed per D1654; failure mode is accumulation of 1/8" coating loss from scribe or medium #8 blisters).
Impact Resistance	D2794	Impact Resistance over 60 inch lb. (Forward impact using 0.625" ball).
Weathering Resistance	D2244, D523 (60° Method)	Weathering Resistance over 1,000 hours (Failure mode is 60% loss of gloss or color variance of more than 3 delta-E color units).

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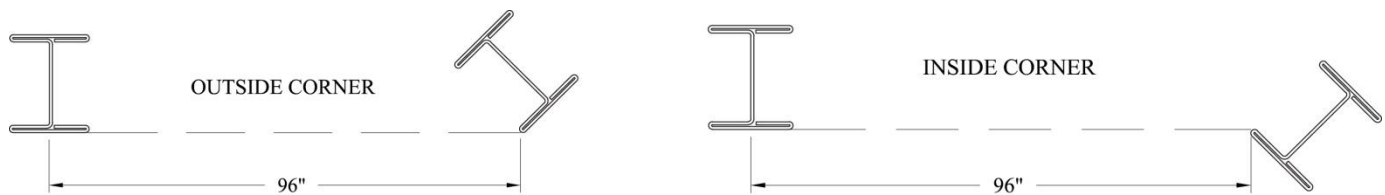
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Table 3 – Impasse II® Post Spacing		
Span	8' Nominal (95" Rail)	
	Line & End Posts	
Post Size	3" x 2.75" x 12 Ga. I-Beam	4" x 2.75" x 11 Ga. I-Beam
Post Settings $\pm \frac{1}{4}"$ O.C.	96"	96"

**For Corner Posts see Figure 1*

Figure 1



END OF SECTION

SECTION 329113- SOIL PREPARATION

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes planting soils specified by composition of the mixes.
- B. Related Requirements:
 - 1. Section 32930 PLANTS for placing planting soil for plantings.

1.1 DEFINITIONS

- A. AAPFCO: Association of American Plant Food Control Officials.
- B. Backfill: The earth used to replace or the act of replacing earth in an excavation. This can be amended or unamended soil as indicated.
- C. CEC: Cation exchange capacity.
- D. Compost: The product resulting from the controlled biological decomposition of organic material that has been sanitized through the generation of heat and stabilized to the point that it is beneficial to plant growth.
- E. Duff Layer: A surface layer of soil, typical of forested areas, that is composed of mostly decayed leaves, twigs, and detritus.
- F. Imported Soil: Soil that is transported to Project site for use.
- G. Layered Soil Assembly: A designed series of planting soils, layered on each other, that together produce an environment for plant growth.
- H. Manufactured Soil: Soil produced by blending soils, sand, stabilized organic soil amendments, and other materials to produce planting soil.
- I. NAPT: North American Proficiency Testing Program. An SSSA program to assist soil-, plant-, and water-testing laboratories through interlaboratory sample exchanges and statistical evaluation of analytical data.

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- J. Organic Matter: The total of organic materials in soil exclusive of undecayed plant and animal tissues, their partial decomposition products, and the soil biomass; also called "humus" or "soil organic matter."
- K. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified as specified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- L. RCRA Metals: Hazardous metals identified by the EPA under the Resource Conservation and Recovery Act.
- M. SSSA: Soil Science Society of America.
- N. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- O. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.
- P. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil"; but in disturbed areas such as urban environments, the surface soil can be subsoil.
- Q. USCC: U.S. Composting Council.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include recommendations for application and use.
 - 2. Include test data substantiating that products comply with requirements.
 - 3. Include sieve analyses for aggregate materials.
 - 4. Material Certificates: For each type of **imported soil and soil mix** before delivery to the site, according to the following:
 - a. Manufacturer's qualified testing agency's certified analysis of standard products.
 - b. Analysis of fertilizers, by a qualified testing agency, made according to AAPFCO methods for testing and labeling and according to AAPFCO's SUIP #25.

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c. Analysis of nonstandard materials, by a qualified testing agency, made according to SSSA methods, where applicable.

B. Samples: For each bulk-supplied material, **1-quart** volume of each in sealed containers labeled with content, source, and date obtained. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of composition, color, and texture.

1.3 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent, state-operated, or university-operated laboratory; experienced in soil science, soil testing, and plant nutrition; with the experience and capability to conduct the testing indicated; and that specializes in types of tests to be performed.

1.4 PRECONSTRUCTION TESTING

A. Preconstruction Soil Analyses: For each unamended soil type, perform testing on soil samples and furnish soil analysis and a written report containing soil-amendment and fertilizer recommendations by a qualified testing agency performing the testing according to "Soil- Sampling Requirements" and "Testing Requirements" articles.

1. Have testing agency identify and label samples and test reports according to sample collection and labeling requirements.

1.5 SOIL-SAMPLING REQUIREMENTS

B. Sample Collection and Labeling: Have samples taken and labeled by **Contractor in presence of Owner's Representative**.

1. Number and Location of Samples: Minimum of **three** representative soil samples for each soil to be used or amended for landscaping purposes.

2. Procedures and Depth of Samples: As directed by Owner's Representative.

3. Labeling: Label each sample with the date, location keyed to a site plan or other location system, visible soil condition, and sampling depth.

1.6 TESTING REQUIREMENTS

A. General: Perform tests on soil samples according to requirements in this article.

B. Physical Testing:

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1. Soil Texture: Soil-particle, size-distribution analysis by **one of** the following methods according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods":
 - a. Sieving Method: Report sand-gradation percentages for very coarse, coarse, medium, fine, and very fine sand; and fragment-gradation (gravel) percentages for fine, medium, and coarse fragments; according to USDA sand and fragment sizes.
 - b. Hydrometer Method: Report percentages of sand, silt, and clay.
 2. Total Porosity: Calculate using particle density and bulk density according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
 3. Water Retention: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
 4. Saturated Hydraulic Conductivity: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods"; at 85% compaction, according to ASTM D 698 (Standard Proctor).
- C. Chemical Testing:
1. CEC: Analysis by sodium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 3- Chemical Methods."
- D. Fertility Testing: Soil-fertility analysis, including the following:
1. Percentage of organic matter.
 2. CEC, calcium percent of CEC, and magnesium percent of CEC.
 3. Soil reaction (acidity/alkalinity pH value).
 4. Buffered acidity or alkalinity.
 5. Nitrogen ppm.
 6. Phosphorous ppm.
 7. Potassium ppm.
 8. Manganese ppm.
 9. Manganese-availability ppm.

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10. Zinc ppm.
 11. Zinc availability ppm.
 12. Copper ppm.
 13. Sodium ppm and sodium absorption ratio.
 14. Soluble-salts ppm.
 15. Presence and quantities of problem materials including salts and metals cited in the Standard protocol. If such problem materials are present, provide additional recommendations for corrective action.
 16. Other deleterious materials, including their characteristics and content of each.
- E. Organic-Matter Content: Analysis using loss-by-ignition method according to SSSA's "Methods of Soil Analysis - Part 3- Chemical Methods."
- F. Recommendations: Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated to produce satisfactory planting soil suitable for healthy, viable plants indicated. Include, at a minimum, recommendations for nitrogen, phosphorous, and potassium fertilization, and for micronutrients.
1. Fertilizers and Soil Amendment Rates: State recommendations in weight per 1000 sq. ft. for 6-inch depth of soil.
 2. Soil Reaction: State the recommended liming rates for raising pH or sulfur for lowering pH according to the buffered acidity or buffered alkalinity in weight per 1000 sq. ft. for 6-inch depth of soil.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and compliance with state and Federal laws if applicable.
- B. Bulk Materials:
1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

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3. Do not move or handle materials when they are wet or frozen.
4. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

PART 2 - MATERIALS

2.1 PLANTING SOILS SPECIFIED BY COMPOSITION

- A. General: Soil amendments, fertilizers, and rates of application specified in this article are guidelines that may need revision based on testing laboratory's recommendations after preconstruction soil analyses are performed.
- B. Planting-Soil Type for turf and planting beds: Existing, on-site surface soil, with the duff layer, if any, retained **and stockpiled on-site**; modified to produce viable planting soil. Blend existing, on-site surface soil with soil amendments, per Owner's standards.

2.2 INORGANIC SOIL AMENDMENTS

- A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:
 1. Class: T, with a minimum of 99 percent passing through a No. 8 sieve and a minimum of 75 percent passing through a No. 60 sieve.
 2. Class: O, with a minimum of 95 percent passing through a No. 8 sieve and a minimum of 55 percent passing through a No. 60 sieve.
 3. Form: Provide lime in form of ground **dolomitic limestone**.
- B. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent elemental sulfur, with a minimum of 99 percent passing through a No. 6 sieve and a maximum of 10 percent passing through a No. 40 sieve.
- C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
- D. Perlite: Horticultural perlite, soil amendment grade.
- E. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through a No. 50 sieve.
- F. Sand: Clean, washed, natural or manufactured, free of toxic materials, and according to ASTM C 33/C 33M.

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2.3 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-composted, stable, and weed-free organic matter produced by composting feedstock and bearing USCC's "Seal of Testing Assurance."
- B. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, debris, and material harmful to plant growth.

PART 3 - EXECUTION

3.1 GENERAL

- A. Place planting soil and fertilizers according to requirements in other Specification Sections and as indicated in the drawings.
- B. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in planting soil.
- C. Proceed with placement only after unsatisfactory conditions have been corrected.

3.2 PLACING AND MIXING PLANTING SOIL OVER EXPOSED SUBGRADE

- A. General: Apply and mix unamended soil with amendments on-site to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.
- B. Subgrade Preparation: Till subgrade to a minimum depth of **4 inches**. Remove stones larger than **1-1/2 inches** in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
 - 1. Apply, add soil amendments, and mix approximately half the thickness of unamended soil over prepared, loosened subgrade according to "Mixing" Paragraph below. Mix thoroughly into top **2 inches** of subgrade. Spread remainder of planting soil.
- G. Mixing: Spread unamended soil to total depth of **6 inches** or as **indicated on Drawings**, but not less than required to meet finish grades after mixing with amendments and natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.
 - 1. Amendments: Apply soil amendments evenly on surface, and thoroughly blend them with unamended soil to produce planting soil.

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- H. Compaction: Compact each blended lift of planting soil to **75 to 82** percent of maximum Standard Proctor density according to ASTM D 698 and tested in-place.
- I. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.3 BLENDING PLANTING SOIL IN PLACE

- A. General: Mix amendments with in-place, unamended soil to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.
- B. Preparation: Till unamended, existing soil only in planting areas free of existing tree roots and outside of critical root zones, to a minimum depth of **6 inches**. Remove stones larger than **1-1/2 inches** in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
- C. Mixing: Apply soil amendments evenly on surface, and thoroughly blend them into full depth of unamended, in-place soil to produce planting soil.
- D. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.4 PROTECTION

- A. Protection Zone: Identify protection zones according to local standards.
- B. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:
 - 1. Storage of construction materials, debris, or excavated material.
 - 2. Parking vehicles or equipment.
 - 3. Vehicle traffic.
 - 4. Foot traffic.
 - 5. Erection of sheds or structures.
 - 6. Impoundment of water.
 - 7. Excavation or other digging unless otherwise indicated.

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- C. If planting soil or subgrade is over compacted, disturbed, or contaminated by foreign or deleterious materials or liquids, remove the planting soil and contamination; restore the subgrade as directed by Owner and replace contaminated planting soil with new planting soil.

3.5 CLEANING

- A. Protect areas adjacent to planting-soil preparation and placement areas from contamination. Keep adjacent paving and construction clean and work area in an orderly condition.
- B. Remove surplus soil and waste material including excess subsoil, unsuitable materials, trash, and debris and legally dispose of them off Owner's property unless otherwise indicated.
 - 1. Dispose of excess subsoil and unsuitable materials on-site where directed by Owner.

END OF SECTION

SECTION 329200- TURF AND GRASSES

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Seeding.
- 2. Erosion-control material(s).
- 3. Grass paving.

- B. Related Requirements:

- 1. Section 329300 "Plants" for trees, shrubs, ground covers, and other plants as well as border edgings and mow strips.

1.3 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- C. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (rats, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- D. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See **Section 329113 "Soil Preparation"** and drawing designations for planting soils.
- E. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For landscape Installer.
- B. Certification of Grass seed: From seed vendor for each grass-seed monostand and mixture, stating that the botanical and common name, percentage of weight of each species and variety, and percentage of purity, germination and weed seed. Include the year of production and the date.

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C. Product Certification: For fertilizers, from manufacturer.

D. Pesticides and Herbicides: Product label and manufacturer's application specific to project.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of turf during the calendar year. Submit before expiration of required maintenance periods.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful turf establishment.

1. Experience: **Five** years' experience in turf installation

2. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

3. Pesticide Applicator: State licensed, commercial.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.

2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

3. Accompany each delivery of bulk materials with appropriate certificates.

1.8 FIELD CONDITIONS

A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of **Substantial Completion**.

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions

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PART 2 - PRODUCTS

2.1 SEED

- A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Rules for Testing Seeds" for purity and germination tolerances.
- B. Seed Species:
 - 1. Bermuda Grass
 - 2. St. Augustine Grass
 - 3. Quality: State-certified seed of grass species as listed on drawings for solar exposure.
 - 4. Quality: Seed of grass species as listed on drawings for solar exposure, with not less than **85** percent germination, not less than **95** percent pure seed, and not more than **0.5** percent weed seed.

2.2 FERTILIZERS

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 - 1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.
- B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 - 2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.3 MULCHES

- A. Straw Mulch : Provide Erosion Control Mat

2.4 PESTICIDES

- A. General: Pesticide, registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.
- B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

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- C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

2.5 EROSION CONTROL MATERIALS

- A. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches long.

2.6 GRASS-PAVING MATERIALS

- A. Grass Paving: Cellular, nonbiodegradable plastic mats, designed to contain small areas of soil and enhance the ability of turf to support vehicular and pedestrian traffic, of **manufacturer's standard** nominal mat thickness. Include manufacturer's recommended anchorage system for slope conditions.
- B. Base Course: Sound crushed stone or gravel complying with **ASTM D 448 for Size No. 8**
- C. Sand: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements in ASTM C 33/C 33M for fine aggregate.
- D. Sandy Loam Soil Mix: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements in ASTM C 33/C 33M for fine aggregate blended with planting soil. Use blend consisting of **2/3 sand and 1/3 planting soil, or as specified by manufacturer.**
- E. Soil for Paving Fill: Planting soil.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.
 - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
 - 2. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
 - 3. Uniformly moisten excessively dry soil that is not workable or which is dusty.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Owner and replace with new planting soil.

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3.2 PREPARATION

- A. Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
 - 1. Protect grade stakes set by others until directed to remove them.
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 SOD AREA PREPARATION

- A. General: No sod will be utilized on this project.

3.4 PREPARATION FOR EROSION-CONTROL MATERIALS

- A. Prepare area as specified in "Sod Area Preparation" Article.
- B. For erosion-control mats, install planting soil in two lifts, with second lift equal to thickness of erosion-control mats. Install erosion-control mat and fasten as recommended by material manufacturer.
- C. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.5 PREPARATION FOR GRASS-PAVING MATERIALS

- A. Reduce subgrade elevation soil to allow for thickness of grass-paving system. Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade so that installed paving is within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions.
- B. Install **base course and sand course** and **proprietary growing mix** or **soil for paving fill** as recommended by paving-material manufacturer for site conditions and according to details indicated on Drawings. Compact according to paving-material manufacturer's written instructions.
- C. Install paving mat and fasten according to paving-material manufacturer's written instructions.
- D. Before planting, fill cells of paving mat with **planting soil** and compact according to manufacturer's written instructions.
- E. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.6 SEEDING

- A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph.

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1. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
2. Do not use wet seed or seed that is moldy or otherwise damaged.
3. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.

B. Sow seed at a total rate as indicated on drawings.

C. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.

D. Protect seeded areas with slopes exceeding **1:4 with erosion-control blankets** installed and stapled according to manufacturer's written instructions.

3.7 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents according to requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with others in proximity to the Work.

B. Post Emergent Herbicides: (Selective and Non-selective): Apply only as necessary so to treat already germinated weeds and according to manufacturer's written recommendations

3.8 CLEAN UP AND PROTECTION

A. Promptly remove soil and debris created by seeding operations from paved areas.

B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash and debris and legally dispose off site.

C. Erect Temporary controls as required to protect newly planted areas from traffic.

3.9 MAINTENANCE SERVICE

A. Grass maintenance Service: provide full maintenance by skilled employees 60 days from the date of Substantial completion

END OF SECTION